UWF GRID CONNECTION

REFERENCE DOCUMENTS

UWF RELATED WORKS

VOLUME F2:

EIAR MAIN REPORT (PART 2 OF 2)

Volume A	Planning Application Documents – Application Form; Site/Newspaper Notice; Letters of Consent; Schedule of Submitted Documents etc.	
Volume B	Planning Drawings	
Volume C	UWF Grid Connection EIA Report (EIAR)	Volume C1: EIAR Non-Technical Summary Volume C2: EIAR Main Report Volume C3: EIAR Figures Volume C4: EIAR Appendices
Volume D	Environmental Management Plan for UWF Grid Connection	
Volume E	Appropriate Assessment Reporting	
VOLUME F	**REFERENCE DOCUMENTS FOR OTHER ELEMENTS OF THE WHOLE UWF PROJECT**	Volume F1 to F3: UWF Related Works EIA Report **VOLUME F2: EIAR MAIN REPORT (2 PARTS)** Volume F4: Environmental Management Plan for the UWF Related Works Volume F5 TO F7: 2018 UWF Replacement Forestry EIA Report Volume F8 to F9: Upperchurch Windfarm **DETAILS OVERLEAF**

Planning Application to An Bord Pleanála
by Ecopower Developments Limited, Zetec House, IDA Purcellsinch Business Park, Kilkenny.
Tel: 056-7750140. Email:office@ecopower.ie

Project Website: www.upperchurchwindfarmgridconnection.ie

REFERENCE DOCUMENTS DETAILS

Volumes F1 to F3: 2018 UWF Related Works EIA Report

Volume F1: EIAR Non-Technical Summary & EIAR Figures

Volume F2: EIAR Main Report (2 Parts)

Volume F3: EIAR Appendices (3 Parts)

Volume F4: Environmental Management Plan for the UWF Related Works

Volumes F5 to F7: 2018 UWF Replacement Forestry EIA Report

Volume F5: EIAR Non-Technical Summary & EIAR Figures

Volume F6: EIAR Main Report (2 Parts)

Volume F7: EIAR Appendices (3 Parts)

Volumes F8 to F9: Upperchurch Windfarm

Volume F8: 2013 EIS for Upperchurch Windfarm

Volume F9: 2013 RFI for Upperchurch Windfarm & 2014 ABP Inspector's Report for Upperchurch Windfarm & 2014 Grant of Permission & Conditions for Upperchurch Windfarm

UPPERCHURCH WINDFARM RELATED WORKS

(UWF RELATED WORKS)

VOLUME C2: REVISED EIAR MAIN REPORT

(PART 2 OF 2)

Volume A	Planning Application Documents – Application Form; Site/Newspaper Notice; Letters of Consent; Schedule of Submitted Documents etc.	
Volume B	Planning Drawings	
VOLUME C	**UWF RELATED WORKS REVISED EIA REPORT (Revised EIAR)**	Volume C1: Revised EIAR Non-Technical Summary **VOLUME C2: REVISED EIAR MAIN REPORT (2 PARTS)** Volume C3:Revised EIAR Figures Volume C4: Revised Appendices
Volume D	Revised Environmental Management Plan for UWF Related Works	
Volume E	Revised Appropriate Assessment Reporting	
Volume F	Reference Documents for Other Elements of the Whole UWF Project	Vol F1 to F3: UWF Grid Connection EIA Report Vol F4: Environmental Management Plan for the UWF Grid Connection Vol F5 to F7: 2018 UWF Replacement Forestry EIA Report Vol F8 to F9: Upperchurch Windfarm

Planning Application to Tipperary County Council
by Ecopower Developments Limited, Zetec House, IDA Purcellsinch Business Park, Kilkenny.
Tel: 056-7750140. Email:office@ecopower.ie

Project Website: www.upperchurchwindfarm.ie

Upperchurch Windfarm Related Works (UWF Related Works)

UWF Related Works Revised EIA Report (EIAR)

VOLUME C2: REVISED EIAR MAIN REPORT

(Part 2 of 2)

EIA Report Authors:

Inis

HYDRO ENVIRONMENTAL SERVICES

tli GROUP

RPS

macroworks

EY DKM

awnconsulting

AiBridges
Total Communications Solutions
...bridging the divide

Malachy Walsh and Partners
Engineering and Environmental Consultants

NRB consulting engineers

Environmental Agricultural Engineering Consultancy

Compliance Engineering Ireland Ltd.
Test & Certification Solutions

KILKENNY ARCHAEOLOGY
Archaeological Consultants

EIAR Coordinator:

ECOPOWER

January 2019

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Chapter 11: Water

Topic Chapter Authors:

HYDRO ENVIRONMENTAL SERVICES

EIAR Coordinator:

ECOPOWER

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List of Figures

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

List of Appendices

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

Glossary of Terms

Term	Definition
Aquifer	A permeable geological stratum or formation that can both store and transmit water in significant quantities.
Baseflow	Water which enters streams/rivers from groundwater flow and maintains streamflow during dry periods.
Blanket Bog	Blanket bog is an area of peatland, forming where there is a climate of high rainfall and a low level of evapotranspiration, allowing decomposed organic material to accumulate over large expanses of undulating ground.
Biochemical Oxygen Demand	A measure of the amount of oxygen used in water by bacteria in the degradation of organic matter.
Electrical Conductivity	A measure of the ability of water to conduct an electrical current and is proportional to the concentration of irons in the solution.
Fluvio-glacial Deposits	Sediments deposited by river or/and glacial action.
Groundwater	Water under a pressure greater than atmospheric pressure which is present in the saturated zone of the soil.
Groundwater Catchment	The surface area determined by groundwater flow within which recharged rainfall will contribute to (i.e. well, spring, river, Lake etc.)
Groundwater Body	A distinct volume of groundwater within an aquifer or system of aquifers, which is hydraulically isolated or partially isolated from nearby groundwater bodies.
Groundwater Flowpath	The path of groundwater flow through soil or rock via pores, fractures, bedding planes etc.
Groundwater Gradient	The direction of groundwater flow as a result of the slope of the groundwater table.
Groundwater Table	The surface at which pore water pressure in an aquifer is equal to atmospheric pressure, and which separates the saturated zone from the unsaturated zone.
Permeability	The rate at which a fluid flows through a porous medium under the hydraulic head operating within the medium. Usually, the greater the porosity, the greater the permeability.
Recharge	Infiltration of rainfall into the local groundwater system.
Surface Water Runoff	Overland flow of water as a result of rainfall
Saturated Zone	The zone below the groundwater table in which all the soil pores and rock fractures are filled with water. It underlies the unsaturated zone (see below).
Spring	A flow of groundwater on the ground surface that occurs where the water table intercepts the ground surface.
Surface Water Catchment	The surface area determined by topographic features within which falling rain will contribute to run-off at a particular point under consideration.
Suspended Sediments	Particulate solids (i.e. sand, clay, silt, peat particles) entrained in surface water flow.
Unsaturated Zone	The zone below the land surface and above the groundwater table which contains water and air in the open spaces, or pores.

List of Abbreviations

Abbreviation	Full Term
BPM	Ecopower Best Practice Measure developed by members of the EIAR Team
NHA	National Heritage Area as defined by the National Parks and Wildlife Services
EPA	Environmental Protection Agency
SWB/GWB	Surface Water Bodies / Groundwater Bodies
GSI	Geological Survey of Ireland
WFD	Water Framework Directive
PD	Ecopower Project Design Environmental Protection Measure developed by members of the EIAR Team
SAC	Special Areas of Conservation as defined by the National Parks and Wildlife Services
UGC	Underground Cables
UWF	Upperchurch Windfarm

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11 Environmental Factor: Water

11.1 Introduction to the Water Chapter

11.1.1 What is Water?

Water relates to the hydrology and hydrogeology in the area of the Whole UWF Project. Hydrology is the term used for surface water drainage within regional and local catchments. Hydrogeology is the distribution and flow of groundwater within aquifers in the local groundwater bodies. The local hydrology and hydrogeology are assessed with respect surface water bodies, groundwater bodies, water dependant designated sites (i.e. SACs, NHAs etc.), drinking water supplies and local water dependent habitats.

11.1.2 Overview of Water in the Local Environment

With respect of surface water, the existing environment comprises regional and local surface water bodies within the Suir and Shannon River Basin Districts (RBDs).

Regional surface water bodies in which the UWF Related Works are is located include the Mulkear River (River Shannon) and the Clodiagh River (River Suir), see Figure RW 11.1.1 Location of the UWF Related Works – River Basin Map and Figure RW 11.1.2: Location of the UWF Related Works – Regional Hydrology.

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

An overview of the regional and local hydrology is shown in the table below.

River Basin District	Regional Catchment	Local Surface Water Body
Shannon	Mulkear	Bilboa
Suir	Clodiagh	Clodiagh
		Turraheen (Multeen)
		Owenbeg

The Mulkear River and Clodaigh River catchments have very high significance as they both contain Natura 2000 designated sites downstream of the development (i.e. Lower River Shannon SAC and Lower River Suir SAC respectively).

In respect of groundwater, the existing environment comprises 2 no. local groundwater bodies (GWBs) - the Slieve Phelim GWB and the Templemore A GWB. Both these GWBs have been classified as “Good Status” by the Water Framework Directive (WFD) characterisation process. Both GWBs in the area of the UWF Related Works comprise Poor Bedrock Aquifers types in terms of their potential productivity as a groundwater supply sources.

Public and private water supplies comprise surface water abstractions from local streams or rivers; groundwater abstractions, using groundwater wells from the underlying bedrock aquifers, or springs discharges from shallow groundwater flow along the subsoil and bedrock interface.

11.1.3 Sensitive Aspects of the Water 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	Local Surface Water Bodies	Section 11.2
Sensitive Aspect No. 2	Local Groundwater Bodies	Section 11.3
Sensitive Aspect No. 3	Local Wells & Springs	Section 11.4
Sensitive Aspect No.4	Lower River Shannon SAC	Section 11.5
Sensitive Aspect No.5	Lower River Suir SAC	Section 11.6
Sensitive Aspect No.6	Local Water Dependent Habitats	Section 11.7

Each of the above listed Sensitive Aspects are evaluated individually in Sections 11.2 to 11.7 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 11.2 to 11.7. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

11.1.4 Sensitive Aspects excluded from further evaluation

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

Bleanbeg Bog NHA	Evaluated as having no potential for effects due to: Bleanbeg Bog NHA is an upland blanket bog which is located approximately 12.2km west of the UWF Related Works and Upperchurch Windfarm and 13.2km west of the UWF Replacement Forestry. In relation to the UWF Grid Connection - the 110kV UGC route runs downslope (down-gradient) at a distance of approximately 2.5km of the NHA. Due to the large separation distance and the nature of the excavation works (i.e. shallow trench in overburden) no hydrological impacts on Bleanbeg Bog NHA are expected.
Mauherslieve Bog NHA	Evaluated as having no potential for effects due to: Mauherslieve Bog NHA is an upland blanket bog which is located approximately 5km west of the UWF Related Works and Upperchurch Windfarm and 6.5km west of the UWF Replacement Forestry. In relation to the UWF Grid Connection - the 110kV UGC route runs downslope (down-gradient) at a distance of approximately 0.6km. Due to the large separation distance and the nature of the excavation works (i.e. shallow trench in overburden) no hydrological impacts on Mauherslieve Bog NHA are expected.
Clare Glen SAC	Evaluated as having no potential for effects due to: The UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm and UWF Other Activities are not located within the Clare River catchment therefore there is no potential for effects by these Elements. In relation to the UWF Grid Connection - the Clare Glen SAC is located approximately 10km downstream of the UWF Grid Connection (110kV UGC) within the Clare River catchment. The qualifying interests, which includes Old Oak Woodlands and Killarney Fern, are terrestrial based on therefore no hydrological impacts are anticipated.
Surface Water Abstractions (Public / private water abstractions from local stream or rivers)	Evaluated as having no likely effects due to: No surface water abstractions were identified during the scoping exercise, field surveys or by the public consultations meetings. Notwithstanding this, the Project Design and Project Design Measures described in this chapter and the related BPMs in terms of surface water quality protection will ensure no significant impacts are likely to occur.

11.1.5 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 11-1 below.

Table 11-1: 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 Main EIA Report of this EIA Report).

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

11.1.6 The Authors of the Water Chapter

This report on the Environmental Factor Water has been written by David Broderick (BSc, H. Dip Env Eng, MSc): Hydrogeologist and Michael Gill (P.Geo., B.A., B.A.I., M.Sc., Dip. Geol, MIEI): Environmental Engineer of Hydro-Environmental Services (HES) which was established in 2005 as a hydrological, hydrogeological and environmental practice, specialising in peatland and upland hydrology in Ireland and Northern Ireland.

11.1.7 Sources of Baseline Information

The information sources outlined in Table 11-2 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 11-2: Sources of Baseline Information for Water

Type	Source
Consultation	Feedback was received from • Inland Fisheries Ireland • Health Services Executive • Irish Water • Office of Public Works • National Federation of Group Water Schemes • Members of the public during the Public Consultation and Information Day See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.

Type	Source
Industry Guidance	• Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements; • National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes; • Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes • Wind Farm Development Guidelines for Planning Authorities (2006); • Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh; • Coillte (2009): Forest Operations & Water Protection Guidelines; • Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford; • UK Pollution Prevention Guidelines (PPG) PPG1 - General Guide to Prevention of Pollution and PPG5 – Works or Maintenance in or Near Watercourses; • 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; • Inland Fisheries Ireland 2016: Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters; • DoELG, EPA, and GSI (1999): Groundwater Protection Schemes. Department of the Environment and Local Government (DOELG), Environmental Protection Agency (EPA) and the Geological Survey of Ireland (GSI); • EPA Drinking Water Advice Note No. 7: Source Protection and Catchment Management to Protect Groundwater Supplies; • EPA Drinking Water Advice Note No. 8: Developing Drinking Water Safety Plans; and, • EPA Drinking Water Advice Note no. 14: Borehole Construction and Wellhead Protection
Desktop	• Environmental Protection Agency database and Hydrotool Map Viewer (www.epa.ie); • Geological Survey of Ireland Databases (www.gsi.ie); • Met Eireann Meteorological Databases (www.met.ie); • National Parks & Wildlife Services Public Map Viewer (www.npws.ie); • Water Framework Directive "WaterMaps" Map Viewer (www.wfdireland.ie); • OPW Indicative Flood Maps (www.floodmaps.ie); • CFRAM Flood Risk Assessment maps (www.cfram.ie); • Department of Environment, Community and Local Government (www.myplan.ie); and, • Pre-surveyed dwelling house locations as an indicator of potential local groundwater supplies (i.e. wells). • Chapter 10: Soils • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Environmental Impact Statement 13510003 • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Response to Further Information 13510003 • An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 • An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040ESB 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	• Walkover surveys and hydrological mapping at the UWF Related Works areas at the Consented Windfarm site;

Type	Source
	• Surveys and hydrological mapping of the preliminary UWF Grid Connection route was undertaken; • Characterisation of all watercourse crossings along the construction works areas (refer to Appendix 11.1);Surface water sampling (refer to Appendix 11.2);Well survey of private dwellings, and their associated water supplies (wells or springs if present) within 50m of the UWF Related Works construction works areas; Identification of local water supplies along the works area through public consultation meetings with the local community; and, • A site-specific Flood Risk Assessment (Stage II) was undertaken for UWF Related Works (refer to Appendix 11.3).

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

11.1.7.1 Certainty and Sufficiency of Information Provided

A clear documentary trail is provided throughout this chapter and chapter appendices 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 site-specific investigations, reports and documents generated by local authorities, statutory agencies and public bodies. All documentation used is referenced at the end of the chapter. In respect of Water, no significant limitations of difficulties were encountered.

11.1.8 Methodology for Evaluating Effects

11.1.8.1 NRA Criteria for Estimating the Importance of Hydrology Attributes

The criteria used for Water appraisals are taken from the NRA (2008) which is also an approach that was referenced by the IGI (2013). The relevant NRA and IGI document are listed above.

Whilst this is tailored to the Water appraisal, the significance judgements correspond very closely with the EPA significance criteria with the main point of note being that significance of impacts range from "Imperceptible to Profound". The criteria and approach for evaluation of Water are set out below.

When assessing the potential impacts on Water resulting from a proposed development, the following approach and criteria are considered:

- Quantify the Importance;
- Estimate the Magnitude of the impact; and,
- Determine the Significance of the impact.

Using the National Roads Authority (2008) guidance, an estimation of the importance of the hydrological and hydrogeological environment within the study area is quantified, using the criteria set out in Table 11-3 and Table 11-4 below.

Table 11-3: Estimation of Importance of Hydrology Attributes (NRA, 2008)

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	• River, wetland or surface water body ecosystem protected by EU legislation, e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or	• River, wetland or surface water body ecosystem protected by national legislation – NHA status

	value on a regional or national scale.	• Regionally important potable water source supplying >2500 homes • Quality Class A (Biotic Index Q4, Q5) • Flood plain protecting more than 50 residential or commercial properties from flooding • Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale.	• Salmon fishery Locally important potable water source supplying >1000 homes. • Quality Class B (Biotic Index Q3-4). • Flood plain protecting between 5 and 50 residential or commercial properties from flooding. • Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	• Coarse fishery. • Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3). • Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale.	• Locally important amenity site for small range of leisure activities. • Local potable water source supplying <50 homes. • Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding. • Amenity site used by small numbers of local people.

Table 11-4: Estimation of Importance of Hydrogeology Attributes (NRA, 2008)

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation, e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale.	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source.

Low	Attribute has a low quality or value on a local scale.	Poor Bedrock Aquifer Potable water source supplying <50 homes.

11.1.8.2 NRA Criteria for Estimating the Magnitude of Impacts on Hydrology Attributes

An estimation of the magnitude of the impact is assessed using criteria in Table 11-5 and Table 11-6 (NRA, 2008) and the rating of environmental impacts is then assessed using criteria in Table 11-7.

Table 11-5: Estimation of Magnitude of Impact on Hydrology Attributes (NRA, 2008)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	• Loss or extensive change to a waterbody or water dependent. • Habitat Increase in predicted peak flood level >100mm. • Extensive loss of fishery Calculated risk of serious pollution incident >2% annually. • Extensive reduction in amenity value
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	• Increase in predicted peak flood level >50mm. • Partial loss of fishery. • Calculated risk of serious pollution incident >1% annually. • Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	• Increase in predicted peak flood level >10mm. • Minor loss of fishery. • Calculated risk of serious pollution incident >0.5% annually. • Slight reduction in amenity value.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Negligible change in predicted peak flood level. • Calculated risk of serious pollution incident <0.5% annually.

Table 11-6: Estimation of Magnitude of Impact on Hydrogeology Attributes (NRA, 2008)

Magnitude	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	• Removal of large proportion of aquifer. • Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. • Potential high risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	• Removal of moderate proportion of aquifer Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. • Potential medium risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	• Removal of small proportion of aquifer Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems.

		• Potential low risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Calculated risk of serious pollution incident <0.5% annually.

11.1.8.3 NRA Criteria for Rating Impacts on Hydrology Attributes

Table 11-7: NRA Rating of Environmental Impacts (NRA, 2008)

	Magnitude of Impact			
Importance of Tribute	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/Moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

11.1.8.4 Methodology for Evaluating Cumulative Impacts (Other Projects or Activities)

Cumulative effects with Other Projects or Activities are evaluated at the end of the Impact Evaluation Table sections, for example the evaluation of the cumulative effect to Local Surface Water Bodies of the various Elements of the Whole UWF Project with Other Projects or Activities is evaluated in Section 11.2.4.10. In addition, the cumulative effect is evaluated individually for each local surface water body with respect to Other Project or Activities.

11.1.8.5 Methodology for Identifying Wells & Springs

Scoping for local groundwater supplies via wells and springs in the study area using the following methods:

- GSI Well Database for wells within 100m of construction works areas (mapped accuracy of 50m);
- Locations of private dwellings (houses/property) within 50m of construction works areas);
- Consultation response from the NFGWS1 (NFGWS had no records of group water schemes in the area);
- Direct consultation with landowners whose dwellings or property is within 50m of construction works areas; and,
- Information on private sources obtained from local residents during the Public Information and Consultation Day

A scoping in distance of 50m was used for identification and assessment of impacts on local wells, and this distance is based on the EPA Code of Practice - Wastewater Treatment and Disposal Systems Serving Single Houses (EPA, 2009) which recommends a minimum distance of 30m from percolation units and

[1] NFGWS - National Federation of Group Water Schemes

down-gradient private wells. Due to the shallow nature of the earthworks associated with the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm, and the fact that no discharges to ground are proposed, a distance of 50m is considered to be more than adequate for assessment of potential impacts on local wells.

11.2 Sensitive Aspect No.1: Local Surface Water Bodies

This Section provides a description and evaluation of the Sensitive Aspect - Local Surface Water Bodies.

11.2.1 BASELINE CHARACTERISTICS of Local Surface Water Bodies

11.2.1.1 STUDY AREA for Water - Local Surface Water Bodies

The study area for Local Surface Water Bodies in relation to the UWF Related Works is described in Table 11-8 and illustrated on Figure RW 11.2.1 Local Surface Water Bodies within the UWF Related Works Study Area to Figure RW 11.2.2: Local Surface Water Bodies (WFD) within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 11-8: UWF Related Works Study Area for Local Surface Water Bodies

Study Area for Local Surface Water Bodies	Justification for the Study Area Extents
Local SWBs catchment divides as defined by the EPA/WFD mapping	Defined by local topography and drainage

11.2.1.2 Baseline Context and Character of Local Surface Water Bodies in the UWF Related Works Study Area

Regional and Local Hydrology

The majority of the UWF Related Works areas (16.2km of Internal Windfarm Cabling, all Realigned Windfarm Roads and the Telecom Relay Pole) are located in the River Suir catchment with the remainder (c 1.7km of Internal Windfarm Cabling and some of the Haul Route Works) in the River Shannon catchment.

Within the River Suir catchment, of the c 16.2km of the Internal Windfarm Cabling within the River Suir catchment, c 11.4km exists within the Clodiagh River catchment, c 3.8km within the Owenbeg River catchment and c 0.8km within the Turraheen River catchment.

A summary of regional and local surface water bodies, including the surface water bodies as defined by the Water Framework Directive (WFD), that the UWF Related Works pass through along with the number of watercourse crossings required for the Works in each surface water body are shown on Table 11-9 below. The occurrence of the Internal Windfarm Cabling, Realigned Windfarm Roads or Haul Route Works, is also identified for each surface water body in Table 11-9.

Table 11-9: Summary of Regional and Local Hydrology at the UWF Related Works Areas

Regional Catchment	Local SWB	WFD SWB	WFD Waterbody	Internal Cable (km)	HW Works	RWR works	No. WC Crossings
Suir	Turraheen River	Turraheen	Multeen (East)_010	0.88	-	-	0
	Clodiagh River	Clodiagh Upper	Clodiagh_010	11.44	HW1 to HW6 HW11 – HW13	RWR1-RWR2	26
	Owenbeg River	Gortatooda	Owenbeg_010	2.46	-	-	3
		Owenbeg Upper	Owenbeg_010	1.38	-	RW3	2
Shannon	Bilboa River	Aughvana	Inch (Bilboa)_010	1.45	HW7 to HW10	-	1

		BilboaMain_3Upper	Bilboa_010	0.29	-	-	0

HW Works – Haul Route Works, RWR – Realigned W indfarm Roads

As shown in Table 11-9 above there are a total of 32 no. watercourse crossings required for the UWF Related Works and there are largely required for the Internal Windfarm Cabling (24 of 32 no.). The majority of the watercourse crossings are located within Clodiagh River catchment (26 no. of 32 no. crossings). There is only 1 no. watercourse crossing in the River Shannon catchment. Refer to Table 11-9 above for the distribution of the watercourse crossings within the local surface water bodies.

Due to the elevated nature of the location of the construction works associated with the UWF Related Works, the majority of the watercourse crossings relate to forestry drains or agricultural drains. A classification of individual watercourse types intercepted by the UWF Related Works is described below.

The Realigned Windfarm Roads will be constructed at 3 no. locations (RWR1, RWR2 and RWR3) and these are all located within the River Suir catchment, in areas of forestry or grassland on elevated ground and largely remote from natural watercourses. There will be 2 no. drain watercourse crossings required for the Realigned Windfarm Roads within the local Clodiagh River catchment.

Haul Route Works requiring public road widening or new roads will be carried out at c 13 no. locations in the vicinity of the Upperchurch Windfarm with works being required in both the River Suir and the River Shannon. There will be a requirement for 8 no. watercourse crossings for the Haul Route Works and these works are all located within the local Clodiagh River catchment.

A summary of the local hydrology and drainage in the area of the Haul Route Works is shown in Table 11-10 below.

Table 11-10: Summary of Local Drainage at the Haul Route Works Locations

Location	Regional Catchment	Local Catchment	Local Hydrology
HW1 – HW4 & HW6	Suir	Clodiagh River	Road widening works along an existing public road. Road drains are present along some sections (of the road) and these drain in a westerly direction towards headwater streams of the Clodiagh River. Along HW2 a public road culvert will be extended by 1m.
HW5	Suir	Clodiagh River	New stretch of road in agricultural grassland. The works site drains to 2 no. field drains that pass beneath the public road on the west prior to discharging into a headwater stream of the Clodiagh River. A new watercourse crossing over a drain (WW14) will be require along this section of the road.
figure	Shannon	Bilboa River	New turning areas in forestry (HW7A) and grassland (HW7B). Area HW7A drains into forestry to the south of the R503 prior to discharging into a headwater stream of the Bilboa River. Area HW7B drains into a field drain which flows in a southeasterly direction close to the R497, before discharging into a headwater stream of the Bilboa River.
HW8 – HW10	Shannon	Bilboa River	Road widening works along an existing public road. Road drains are present along some sections and these drains southerly into field drains that discharge into headwater streams of the Bilboa River.
HW11	Suir	Clodiagh River	New stretch of road in rough grassland. A new watercourse crossing (WW22) over a headwater stream of the Clodiagh will be require along this new section of road.
HW12	Suir	Clodiagh River	Road widening works along an existing public road. Road drains in a southerly direction into a stream which crosses the road to the south of the works area. Along HW12 a public road culvert will be extended by 1m.

HW13	Suir	Clodiagh River	Road widening works along an existing public road. Road drains in a southerly direction into field drains which discharge into a headwater stream of the Clodiagh River.

Existing Water Quality Monitoring Data and WFD Waterbody Status

A summary of the EPA Values (Biotic Index) for surface water within the study area of the UWF Related Works are shown in Table 11-11. A Q-Value is generally only available for the main rivers and streams downstream of the works area.

Biological water quality monitoring and rating refers to the EPA Q-Value system of ranges and is calculated on the in-stream macro-invertebrate community present in a river or stream. A Q-value of 5 indicates very high-water quality while a Q-value of 1 indicates poor water quality. The Q-Value for the main watercourses within the local surface water bodies are typically Good to High. However, a Moderate Q-Value was reported for one location, and this was for a tributary of the Bilboa River.

Table 11-11: Summary of Q-Values for Surface water Bodies in the UWF Related Works Study Area (EPA)

WFD River Waterbody	EPA Watercourse*	EPA Location Description	Easting / Northing	EPA Q Status
SH_Mulkear_BilboaMAIN_3Upper	Tributary of Bilboa River	Bridge in Kilcommon	E190280 / N159990	Good
SH_Mulkear_BilboaMAIN_2Mid	Tributary of Bilboa River	Bridge u/s of Bilboa Confluence	E188903 / N158321	Good
SH_Mulkear_Aughvana_1	Tributary of Bilboa River	Bridge SE of Loughbrack	E191722 / N158507	Moderate
SE_SuirClodiagh_ClodiaghMid_Mid	Clodaigh River	Bridge North of Castlehill	E198165 / N165026	High
SE_SuirClodiagh_ClodiaghMid_Mid	Clodaigh River	Bridge East of Rathcarden	E202314 / N163807	Good
Owenbeg Upper	Owenbeg River (Suir)	Northeast of Knockmehil	E199682 / N160113	Good
Owenbeg Upper	Owenbeg River (Suir)	Bridge SW of Rossoulty	E201650 / N159238	Good

The Water Framework Directive "Status" and "Risk Result" for surface water bodies in the area of the UWF Related Works are shown in Table 11-12.

The status of the surface water bodies at the study area is typically Good. The majority of the SWBs are Not at Risk of achieving Good Status with the exception of the Clodiagh_010 and the Inch (Bilboa)_010 which are reported to be At Risk of morphological and forestry related effects such as suspended sediment and eutrophication.

Classification of Watercourses at Crossing Locations

32 no. watercourse crossings will be required to facilitate the UWF Related Works, and these are largely located along the route of the Internal Windfarm Cabling. Shown in Table 11-12 below is a summary classification of the watercourses which will be crossed by the UWF Related Works. The majority of the watercourse crossings relate to forestry drains or agricultural drains (~75%), and this is a reflection of the setting and topography of the area of the windfarm (i.e. upland agriculture and forestry).

There are only 6 no. natural stream crossings of note (18%, Class 1 and Class 2) and these are mainly located at headwater streams (first / second order) of the Clodaigh River (5 no.), with 1 no. being located at a headwater stream of the Owenbeg River.

Table 11-12: Characterisation of Watercourse Crossings at the UWF Related Works areas

Class	Watercourse Description	Total No.	Total With In-Stream Works
1	EPA mapped blue line, major river or stream (fisheries value)	1	1
2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	5	4
3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	2	2
4	Drain (no fisheries value)	24	18
	Total	**32**	**25**

Results of Surface Water Sampling

2 no. rounds of surface water sampling were completed at 5 no. sampling locations at the larger Class 1 / Class 2 watercourse crossing locations at the works areas (11 no. samples in total). Based on a comparison of the results with respect to the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), the results are consistent with a waterbody status of High to Good. The average result for suspended solids (~25.4mg/L) was slightly above the Freshwater Fish Directive 2006/44/EC threshold value of 25mg/L. The average is skewed as suspended solids were less than 10mg/L in 8 no. of the 11 no. samples.

Refer to Appendix 11.2 for sampling locations and all sampling results.

Flood Risk Assessment

A site-specific flood risk assessment was undertaken (in accordance with the guidance document 'The Planning System and Flood Risk Management Guidelines for Planning Authorities - DoEHLG, 2009) for the UWF Related Works areas and this report is attached as Appendix 11.3. A summary of the flood risk assessment is provided below.

Due to the elevated nature of the majority of the construction works areas, the majority of the works areas are not located within any mapped fluvial or pluvial flood extent zones and are considered to be areas at low risk to flooding (located within fluvial Flood Zone C (Low Risk).

There are no mapped fluvial or pluvial flood zones at the UWF Related Works areas which includes the watercourse crossing locations. The works will have no potential to cause increased flood risk.

11.2.1.3 Importance of Local Surface Water Bodies

The majority of the local surface water bodies within the study area have been assigned Good to High Status by the WFD. Where a Good to High Status has been assigned, there will be a requirement to prevent deterioration and maintain at least a Good status. Regardless of existing status, there will also be a requirement to protect, enhance and restore all waters with an aim to achieve at least Good Status for all waterbodies.

However, as described above, the majority of the watercourses at construction works areas associated with the UWF Related Works are either drains or watercourses of low ecological value with no fisheries potential and therefore there is no requirement for these watercourses to achieve at least Good status. However, these drains / watercourses are pathways to the larger streams and rivers downstream of the works areas which are required to achieve at least Good Status under the WFD.

11.2.1.4 Sensitivity of Local Surface Water Bodies

The primary sensitivities with respect to the local surface water bodies will be effects on water quality and effects on morphology which will be important to protect in terms of the overall WFD status of the waterbody. As stated above, the majority of the watercourses at the works areas are drains or watercourses of low ecological value, and there are typically, themselves, not sensitive to impact but are potential pathways.

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

Based on the WFD surface waterbody reports (www.wfdireland.ie), with the exception of the Inch(Bilboa)_010, the Shannon Regional catchment waterbodies in the study areas, are reported to be **Not at Risk** from water quality impacts (diffuse and point source) or morphological impacts. This suggests that there are no significant negative rising trends relating to water quality or morphology to the majority of the River Shannon catchment in the study areas.

In the River Suir catchment, similarly with the exception of the Clodiagh_0101, based on the WFD surface waterbody reports (www.wfdireland.ie), the Suir Regional catchment waterbodies in the study areas are reported to be **Not at Risk** from water quality impacts (diffuse and point source) or morphological impacts. The Clodiagh River catchment is **At Risk** from morphological impacts (channelization) and forestry related impacts, and it is therefore considered that there are potential negative rising trends relating to water quality or morphology.

11.2.1.6 Receiving Environment (the Baseline + Trends)

It is assumed that the status of the surface water bodies within the study area will be at least Good during the lifetime of the UWF Related Works. This is based on the assumption that surface waterbodies will have to achieve at least Good Status.

11.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.2.2.1 Cumulative Evaluation Study Areas

11.2.2.1.1 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 Local Surface Water Bodies	Justification for the Study Area Extents
As defined by local surface water catchments. The cumulative assessment for UWF Related Works was completed on a Local Surface Water Body scale.	Only other developments within the same local surface water body as the subject development can contribute to cumulative impacts within the surface water body.

The study is illustrated on Figure CE 11.2.1 Local Surface Water Bodies within the UWF Related Works Cumulative Evaluation Study Area to Figure CE 11.2.2: Local Surface Water Bodies (WFD) within the UWF Related Works Cumulative Evaluation Study Area.

11.2.2.1.2 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 11.2.2.2.1 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 11-13 and illustrated on Figure WP 11.2.1 Local Surface Water Bodies within the Whole Project Cumulative Evaluation Study Area to Figure WP 11.2.2: Local Surface Water Bodies (WFD) within the Whole Project Cumulative Evaluation Study Area.

Table 11-13: Whole Project Cumulative Evaluation Study Area for Local Surface Water Bodies

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	As defined by local surface water catchments and regional surface water catchments. The cumulative assessment was completed on a Local Surface Water Body scale and at Regional Catchment scale (the regional catchment scale was done to assess impacts on downstream SAC's as described further below in the chapter).	Only other developments within the same local surface water body as the subject development or the or regional surface water catchment as Other Elements of the Whole UWF Project can contribute to cumulative impacts within the surface water body.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

11.2.2.2 Scoping for Other Projects & for Potential for Impacts

The evaluation of cumulative impacts to Local Surface Water Bodies 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 Local Surface Water Bodies 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 A2.3.2.11).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Local Surface Water Bodies with UWF Related Works, however in order to present the totality of the project – Bunkimalta Windfarm has been scoped in for evaluation of cumulative effects relating to the Other Elements.

11.2.2.2.1 Potential for Impacts to Local Surface Water Bodies

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 Local Surface Water Bodies. The results of this evaluation are included in Table 11-14.

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 11.2.1 and Figure WP 11.2.2. The baseline character of the areas around these Elements is described in Section 10.2.2.3.

Table 11-14: 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	Evaluated as excluded: Neutral effect/No potential for effects due to: The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no hydrological / water quality effects are likely. Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore no surface water impacts are expected. Monitoring Activities do not require any major construction activities. Therefore, no surface water impacts are expected. Once off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality. During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore no impacts are expected.
Other Projects or Activities	

Bunkimalta Windfarm	Note: The Bunkimalta Windfarm is not located within any of the same local surface water bodies as the UWF Related Works, therefore the Bunkimalta Windfarm cannot cause cumulative effects to **Local Surface Water Bodies** with the UWF Related Works. However, the Other Elements must be considered because the UWF Related Works are part of a whole project. Therefore, the cumulative information and evaluation for the Other Elements of the Whole UWF Project (in particular the UWF Grid Connection) are included in this table, in order to show the totality of the project. Yes, included for the evaluation of cumulative sedimentation effects with the UWF Grid Connection on a regional catchment scale with respect to the downstream SAC's. Evaluated as excluded: Neutral cumulative water quality effects with UWF Grid Connection due to oils/cement contamination, increased flood risk or runoff from permanent surfaces, due to the separation distances, the implementation of best practice oil, fuel and cement measures as stated in the Bunkimalta Windfarm EIS. No potential for cumulative morphological effects due to separation, no potential for cumulative increased flood risk or runoff rates due to the sizing of new crossing structures to cope with a minimum 1 in 100 year flood event and implementation of surface water drainage system.

11.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

The majority of the footprint of the UWF Grid Connection is located within the River Shannon (Shannon River Basin District) surface water catchment, with the remainder located in the River Suir (South Eastern River Basin District) surface water catchment. In contrast, the majority of the footprint of the UWF Related Works and the Upperchurch Windfarm are located in the River Suir catchment with the remainder located in the River Shannon catchment. The UWF Replacement Forestry is located entirely within the River Suir catchment.

The Water Framework Directive "Status" and "Risk Result" for surface water bodies in the area of the Whole UWF Project are shown in Table 11-15. The relevant Individual Project Element is identified in the right and side column.

The status of the surface water bodies at the study area is typically Good. The majority of the SWBs are Not at Risk of achieving Good Status with the exception of the Clodiagh_010 and the Inch (Bilboa)_010 which are reported to be At Risk of morphological and forestry related effects such as suspended sediment and eutrophication.

Table 11-15: WFD Waterbody Status and Risk Result

Regional Catchment	WFD River Waterbody	WFD Status	WFD Risk Result	Whole UWF Project Element
Shannon	Newport_030	Good	Not at Risk	GC (Mountphilips Substation)
	Small_010	Good	Not at Risk	GC
	Annagh_030	Good	Not at Risk	GC
	Annagh_020	Good	Not at Risk	GC
	Annagh_010	Good	Not at Risk	GC
	Bilboa_010	Good	Under Review	GC
	Inch (Bilboa)_010	Moderate	At Risk	GC / RW / UWF
Suir	Clodiagh_010	Good	At Risk	GC / RW / RF / UWF
	Multeen (East)_10	Good	Not at Risk	RW / UWF
	Owenbeg _10	Good	Not at Risk	RW / UWF

GC = UWF Grid Connection, RW = UWF Related Works, RF = UWF Replacement Forestry, UWF = Upperchurch Windfarm

11.2.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

Within the River Shannon catchment, the Mountphilips Substation site and c.27.4km of the 110kV UGC exist within the Mulkear River regional catchment. The local surface water bodies within the Mulkear River catchment include, (listed from west to east) the Newport River (also referred to as the Mulkear River), Clare River (also referred to as the Annagh River) and the Bilboa River. Within the River Suir catchment, the remaining c.1.5km of the 110kV UGC route is located within the Clodiagh River local surface water body.

There is a total of 63 no. watercourses within the construction works area boundary associated with the UWF Grid Connection, 2 no. of these watercourses are new crossings located along the new access road to Mountphilips Substation, 1 no. watercourse crossing between Mountphilips and the End Masts, 58 no. are located on the 110kV UGC along the public road network (road numbers: R503, L-2166-0, R503, L2264-50 and L6166-0) and the remaining 2 no. are located along the forestry road adjacent to the Consented UWF Substation.

A summary of regional and local surface water bodies, including the surface water bodies as defined by the Water Framework Directive (WFD) that the UWF Grid Connection passes through along with the number of watercourse crossings required in each surface water body are shown on Table 11-16 below. The occurrence of the 110kV UGC, temporary access roads and joint bays, is also identified for each surface water body in Table 11-16.

A classification of individual watercourse types intercepted by the UWF Grid Connection is undertaken in the Character Section further below.

Table 11-16: Summary of Regional Hydrology, Local Hydrology and Proposed Infrastructure along the UWF Grid Connection (110kV UGC)

Regional Catchment	Local SWBs[1]	WFD SWB	WFD River Waterbody[2]	Length of 110kV UGC (km)	No. Water-course Crossings	Potential Instream or Culvert Replacement Works	New Perm Road (km)	No. Joint Bays
Shannon	Newport River[3]	SH_Mulkear_Newport TRIB_1Kilcomenty[1]	Newport_030	1.4	3	3	0.5	1
		SH_Mulkear_Newport MAIN_1Lower	Newport_030	1.5	1	0	0	2
	Small River	SH_Mulkear_Small_1	Small_010	0.7	0	0	0	1
	Clare River	SH_Mulkear_Annagh MAIN_1LOWER	Annagh_030	11.6	29	12	0	14
		SH_Mulkear_AnnaghT RIB_1Abington	Annagh_020	0.4	1	0	0	0
	Bilboa River	SH_Mulkear_BilboaTRI B_4Abington	Bilboa_010	2.6	6	1	0	4
		SH_Mulkear_BilboaM AIN_2Mid	Bilboa_010	4.2	11	5	0	5
		SH_Mulkear_BilboaM AIN_3Upper	Bilboa_010	0.8	1	0	0	1
		SH_Mulkear_Aughvan a_1	Inch (Bilboa)_010	4.2	6	5	0	5

Regional Catchment	Local SWBs[1]	WFD SWB	WFD River Waterbody[2]	Length of 110kV UGC (km)	No. Water-course Crossings	Potential Instream or Culvert Replacement Works	New Perm Road (km)	No. Joint Bays
Suir	Clodiagh River	SE_SuirClodiagh_ClodiaghUpper_Upper	Clodiagh_010	1.5	5	5	0	1

1 Catchments are listed from west to east along the UWF Grid Connection route from the Mountphilips Substation to the Consented UWF Substation

2 Catchment areas as now defined in www.catchments.ie

3 Also referred to as the Mulkear River

Existing Water Quality Monitoring Data and WFD Waterbody Status

A summary of the EPA Values (Biotic Index) for surface water within the study area of the UWF Grid Connection are shown in Table 11-17. A Q-Value is generally only available for the main rivers and streams downstream of the works area.

Biological water quality monitoring and rating refers to the EPA Q-Value system of ranges and is calculated on the in-stream macro-invertebrate community present in a river or stream. A Q-value of 5 indicates very high-water quality while a Q-value of 1 indicates poor water quality. The Q-Value for the main watercourses within the local surface water bodies are typically Good to High. However, a Moderate Q-Value was reported for one location, and this was for a tributary of the Bilboa River.

Table 11-17: Summary of EPA Q-Values for Surface Water Bodies in the UWF Grid Connection Study Area

WFD River Waterbody	EPA Watercourse*	EPA Location Description	Easting / Northing	EPA Q Status
SH_Mulkear_NewportMAIN_1Lower	Mulkear River	Bridge d/s Annagh Bridge	E168236 / N156331	Good
SH_Mulkear_NewportMAIN_1Lower	Mulkear River	Bridge south of Shower	E170270 / N161830	High
SH_Mulkear_NewportMAIN_1Lower	Mulkear River	Rockvale Bridge	E173860 / N163330	High
SH_Mulkear_NewportMAIN_1Lower	Mulkear River	Ford u/s Doonane confluence	E177566 / N163316	High
SH_Mulkear_Small_1	Small River	Upstream of Newport River confluence	E174250 / N162570	Good
SH_Mulkear_AnnaghMAIN_1Lower	Tooreenbrien Stream	Tooreenbrien Bridge	E181444 / N160200	Good
SH_Mulkear_AnnaghMAIN_2Upper	Clare River	Bridge u/s of Inchinmathea Bridge	E184950 / N162060	Good
SH_Mulkear_BilboaMAIN_3Upper	Tributary of Bilboa River	Bridge in Kilcommon	E190280 / N159990	Good
SH_Mulkear_BilboaMAIN_2Mid	Tributary of Bilboa River	Bridge u/s of Bilboa Confluence	E188903 / N158321	Good
SH_Mulkear_Aughvana_1	Tributary of Bilboa River	Bridge SE of Loughbrack	E191722 / N158507	Moderate
SE_SuirClodiagh_ClodiaghMid_Mid	Clodaigh River	Bridge North of Castlehill	E198165 / N165026	High
SE_SuirClodiagh_ClodiaghMid_Mid	Clodaigh River	Bridge East of Rathcarden	E202314 / N163807	Good

*The catchments are listed from west to east along the UWF Grid Connection

Detailed hydrological and aquatic field surveys of watercourses

60 of the 63 no. watercourse crossings are existing culverts/bridges. Most of the larger watercourse crossings consist of bridges, with culverts typically used on smaller watercourse crossings.

Results of Surface Water Sampling

Due to the lack of existing water quality data/biotic data for the majority of the watercourses at the works areas, detailed hydrological and aquatic surveys were undertaken along the works area in order to characterise and categorise watercourses where crossings are required as part of the works. This survey data is presented in Appendix 11.1.

1 no. round of surface water sampling was completed at 19 no. of the larger Class 1 / Class 2 watercourse crossings along the UWF Grid Connection route in January 2019. In addition, 7 no. samples (DSW1 – DSW7) were taken further downstream of the grid in the Clare River and Bilboa River.

Based on a comparison of the results (particularly for ammonia, BOD and ortho-phosphate) with respect to the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), the results are consistent with a waterbody status of Good to High. Results for suspended solids were typically below 10mg/L with the occasional sample been elevated above the Freshwater Fish Directive 2006/44/EC threshold value of 25mg/L. The majority of the samples were well below this threshold.

Classification of Watercourses at Crossing Locations

Based on the field surveys, the watercourses are categorised Class 1 (highest fisheries value) to Class 4 (no fisheries value) as shown in Table 11-18

There is a total of 63 no. watercourses within the construction works area boundary associated with the UWF Grid Connection. 58 no. of the 63 no. watercourse crossing points for the UWF Grid Connection are along the public roads, 3 no. in agricultural lands and the remaining 2 no. watercourse crossings on forestry roads. Along the UWF Grid Connection 110kV UGC route, three larger watercourse crossings of note will occur, these watercourses include the Mulkear (Newport) River at Newport Bridge on the R503 in Newport, Bilboa River at Anglesey Bridge on the R503 near Kilcommon and Clare River at Tooreenbrien Bridge on the R503 near Lackamore. These rivers will be crossed by installing the trench in the road over the bridges.

Shown in Table 11-18 below is a summary classification of the watercourses which will be crossed by the 110kV UGC route. A large proportion of the watercourses at the crossing locations are Drains (~40%, Class 4). Approximately 20% of the watercourses are natural streams with potentially good fisheries value (Class 1 and Class 2).

Table 11-18: Summary Watercourse Characterisation at the 110kV UGC Crossing Locations

Class	Watercourse Description	Total No.	Total With Culvert Replacement Works
1	EPA mapped blue line, major river or stream (fisheries value)	10	2
2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	3	3
3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	25	8
4	Drain (no fisheries value)	25	18
	Total	**63**	**31**

Flood Risk Assessment

A preliminary site-specific flood risk assessment was undertaken (in accordance with the guidance document 'The Planning System and Flood Risk Management Guidelines for Planning Authorities - DoEHLG, 2009) for the UWF Grid Connection together with the Other Elements of the Whole UWF Project.

Due to the elevated nature of the majority of the construction works areas, the majority of the works areas are not located within any mapped fluvial or pluvial flood extent zones and are considered to be areas at low risk to flooding (located within fluvial Flood Zone C (Low Risk).

In addition, there are no significant mapped pluvial flood zones at the UWF Grid Connection areas. Due to elevated and hilly nature of the topography in the area of the development, no significant pluvial flooding would be anticipated.

Interaction with mapped fluvial flooding zones, which are associated with 100-year flooding events or greater, is generally limited to the crossing locations of larger watercourses. It is considered that the locations of the UWF Grid Connection are, for the most part, not susceptible to significant flooding.

UWF Grid Connection: The OPW Preliminary Flood Risk Assessment (PFRA) mapping for the study area indicates that fluvial flooding along the 110kV UGC route is relatively localised to the larger stream and river crossing locations, namely; crossing locations W4 (Mulkear), W28, W31 (Clare River) and W48 (Bilboa River) which are all mapped to be within the 100-year flood zone (Flood Zone A). Access to these crossing locations will only be required during the construction stage (no new permanent infrastructure is required at these watercourses crossing locations).

Geographical Overlap with UWF Related Works:

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. The overlap is small, and any water quality cumulative effects will be localised (<1km downstream).

11.2.2.3.2 Element 3: UWF Replacement Forestry

All of the UWF Replacement Forestry is located within the Clodiagh River catchment (Clodiagh_010), which is part of the River Suir Catchment. The UWF Replacement Forestry site is located in the townland of Foilnaman to the northwest of the Upperchurch Windfarm. The lands to be planted comprise two agricultural landholdings that are separated by a watercourse. The watercourse is a headwater stream of the Clodiagh River and flows in an easterly direction through the UWF Replacement Forestry site.

Existing Water Quality Monitoring Data and WFD Waterbody Status

A summary of the EPA Values (Biotic Index) for surface water within the study area of the UWF Replacement Forestry is shown in Table 11-19. A Q-Value is generally only available for the main rivers and streams downstream of the works area.

Biological water quality monitoring and rating refers to the EPA Q-Value system of ranges and is calculated on the in-stream macro-invertebrate community present in a river or stream. A Q-value of 5 indicates very high-water quality while a Q-value of 1 indicates poor water quality. The Q-Value for the main watercourses within the local surface water bodies are typically Good to High.

Table 11-19: Summary of Q-Values for Surface water Bodies in the UWF Replacement Forestry Study Area (EPA)

WFD River Waterbody	EPA Watercourse*	EPA Location Description	Easting / Northing	EPA Q Status
SE_SuirClodiagh_ClodiaghMid_Mid	Clodaigh River	Bridge North of Castlehill	E198165 / N165026	High
SE_SuirClodiagh_ClodiaghMid_Mid	Clodaigh River	Bridge East of Rathcarden	E202314 / N163807	Good

The Water Framework Directive "Status" for surface water bodies in the area of the UWF Replacement Forestry are shown in Table 11-19. The status of the surface water bodies at the study area is typically Good. The Clodiagh_010 is reported to be At Risk of morphological and forestry related effects such as suspended sediment and eutrophication.

Classification Watercourses at Crossing Locations

A watercourse with fisheries value (Class 1 blue line watercourse, marked on WFD mapping) flows through the western part of the afforestation lands. This stream will be crossed using existing crossing structures. No new structures or works to the existing structure are required.

Results of Surface Water Sampling

2 no. rounds of surface water sampling were completed at 1 no. sampling location at the Class 1 watercourse that flows through the site (taken at WW28 for the UWF Related Works). Based on a comparison of the results with respect to the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), the results are consistent with a waterbody status of High to Good. Refer to Appendix 11.2 for sampling locations and all sampling results.

Flood Risk Assessment

A site-specific flood risk assessment was undertaken (in accordance with the guidance document 'The Planning System and Flood Risk Management Guidelines for Planning Authorities - DoEHLG, 2009) for the UWF Replacement Forestry areas together with the Other Elements of the Whole UWF Project and this report is attached as Appendix 11-3. A summary of the flood risk assessment is provided below.

A section of the UWF Replacement Forestry site at Foilnaman is within a mapped fluvial flood zone. However, there is no new permanent infrastructure associated with this afforestation site.

11.2.2.3.3 Element 4: Upperchurch Windfarm

As stated previously, the majority of the Upperchurch Windfarm infrastructure (20 no. of the 22 no. Consented UWF turbines, the Consented UWF Substation and associated Upperchurch Windfarm Roads) is located in the River Suir catchment.

Only 2 no. turbines are located within the River Shannon catchment, and these turbines are located locally within the Bilboa River catchment. Within the River Suir catchment, 10 no. turbines are located in the Clodiagh River catchment, 8 no. in the Owenbeg River catchment and 2 no. in the Multeen River surface water catchment.

The drainage in and around the Upperchurch Windfarm is dominated by forestry and agricultural drains, and this is due to the elevated nature of the site above the local valleys. There will be a requirement for 1 no. watercourse crossing along the Upperchurch Windfarm footprint and this is over a headwater stream (with no in-stream works) of the Owenbeg River).

Due to elevated and hilly nature of the topography in the area of the Upperchurch Windfarm no significant fluvial or pluvial flooding would be expected. The Sediment Control Plan for the windfarm means no increased flood risk downstream is expected.

Consideration of the Passage of Time: A comparison of water quality sampling results and EPA monitoring data used for the 2013 EIS compared to the 2018 EIAR UWF Related Works data demonstrates that water quality in the windfarm area has improved slightly, with an improvement of Good to High in the Suir Clodiagh catchment, and Poor/Moderate to Moderate in the Bilboa catchment, this change is not considered to be material in the context of the . the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

11.2.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 11.2.2.2.1.

11.2.2.3.5 Other Projects or Activities

Bunkimalta Windfarm (consented): 5 no. turbines of this consented windfarm development within the Clare River catchment and the remaining 11 no. turbines are located within the Newport River (Mulkear) catchment. The grid connection associated with the consented Bunkimalta is predominately within the public road corridor, also within the River Shannon Catchment. The windfarm is located upstream of the UWF Grid Connection.

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

11.2.3 PROJECT DESIGN MEASURES for Local Surface Water Bodies

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 11-20 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect **Local Surface Water Bodies**.

Table 11-20: UWF Related Works Project Design Measures relevant to Local Surface Water Bodies

PD ID	Project Design Environmental Protection Measure (PD)
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. Spoil excavations from public roads being transported to landfill will be covered during transport.
PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.
PD16	For works within 50m of a Class 1 or Class 2 watercourse, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD17	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate.
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse

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PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound (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.

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.

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11.2.4 EVALUATION OF IMPACTS to Local Surface Water Bodies

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) - Local Surface Water Bodies.

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

Table 11-21: 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)*
Morphological Impacts to watercourses due to in-stream works (construction stage)	*Surface Water Quality Impacts due to Nutrient Input (construction stage)*
Surface water quality impacts during conifer plantation tree felling (construction stage)	*Decommissioning Stage effects*
Surface water quality impacts due to earthworks (excavations and storage of overburden), (construction stage)	
Water quality impacts from dewatering of excavations (i.e. cable trench), (construction stage)	
Surface water quality impacts due watercourse crossing works, (construction stage)	
Surface Water Impacts due to Contamination by Fuels, Oils and Chemicals, (construction stage)	
Water Quality Impacts from Cement Based Compounds, (construction stage)	
Increased flood risk due to runoff from permanent hardstanding areas and from new permanent watercourse crossings (culverts), (operational stage)	
Surface water quality impacts due to runoff from permanent access roads, (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 11.2.4.1 to 11.2.4.9.**

Cumulative evaluation of Other Elements with Other Projects is presented in Section 11.2.4.10.

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 11.2.4.11.

11.2.4.1 Impact Evaluation Table: Morphological impacts to watercourses due to in-stream works

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Watercourse crossing, in-stream works
Cumulative Impact Source: Watercourse crossing, in-stream works
Impact Pathway: Direct Excavations

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 channel shape over time. Direct morphological impacts on watercourses will occur during in-stream works such as open trenching for the cable laying and/or culvert emplacement / replacement. These works will involve the excavation of the banks and the bed, along with the removal of some riparian vegetation. The banks and bed of the watercourse will be reinstated following any trenching or culvert works.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Morphological impacts to watercourses due to in-stream works

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
There are 32 no. watercourse crossings required in total for the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Work. In-stream works will be required at 25 no. of these locations - 22 no. in the Clodiagh_010 waterbody catchment and 3 in the Owenbeg_10 waterbody catchment.

The impacts will be localised to the watercourse bank and bed at the crossing location and will be temporary in nature with the exception of 9 no. of the 25.no crossings which will be permanent crossings.

Due to the relatively minor nature of the watercourses being crossed (most are drains or of low ecological importance) and the distributed nature of the works over a relatively large geographical area, the magnitude of impact is considered to be Small Adverse (refer to Table 11-5).

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

- As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- 75% of the in-stream works areas are at Drains (Class 4) or marginal watercourses (Class 3);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams;
- The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);
- The effects will be brief to temporary in nature and reversible (with the exception of the 9 no. permanent crossings); and,

The works will not negatively affect the overall WFD surface water body status as the magnitude of effects will not be significant.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects only relates to the Clodiagh_010 local surface water bodies (within the River Suir regional catchment), where instream works for both UWF Related Works and UWF Grid Connection will occur. In total UWF Related Works will require 22 No. instream works in the Clodiagh_010, and UWF Grid Connection potentially will required 5 No. culverts on drains crossing under the L2264-50 to be replaced (worst case scenario).

There is no potential for cumulative impacts in the Bilboa catchment, as there is no requirement for instream works for UWF Related Works.

The Upperchurch Windfarm and UWF Replacement Forestry will not require any instream works, therefore these projects have no potential to cause cumulative effects with UWF Related Works.

There is also no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- No in-stream works are required for the Consented Windfarm or for UWF Replacement Forestry; and,
- Therefore, the overall potential for in-combination morphological effects with regard to in-stream works is negligible to none.

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

Element 1: UWF Grid Connection

Impact Magnitude:
There will be c.63 no. watercourse crossings for UWF Grid Connection. 3 of the 63 watercourse crossings are located in agricultural lands at the Mountphilips Substation site (all 3 will require instream works for 2 new permanent crossings and 1 temporary crossing), 2 of the 56 watercourse crossings are at the eastern extremity of UWF Grid Connection, and occur along a forestry road, existing culverts are in place and no instream works are required.

The remaining 58 no. watercourse crossings occur along the public road network, and there are a mix of culverts and bridges in place. Culvert replacement works may potentially[2] be required at 31 no. of these watercourse crossings (~50%), bridge structure works (trenching and potential works to parapet walls) at the 3 main bridges along the 110kV UGC at the Newport Bridge, Tooreenbrien Bridge and Anglesey Bridge and potentially also at smaller bridges along the route.

Due to the relatively minor nature of the watercourses being crossed (79% are Class 4 drains or Class 3 low ecological importance), the fact that most are already culverted and the distributed nature of the works within several local surface water bodies over a large geographical area, the magnitude of impact is considered to be negligible (refer to Table 11-5).

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, neligible magnitude combined with the High Importance of the local surface water bodies;

[2] Based on preliminary site investigations, 31. No. existing culverts potentially need to be replaced, this number is used in EIAR to facilitate the cumulative evaluation of the worst case scenario.

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- The vast majority of the watercourse crossing points are existing culverts along the public road network;
- The 31 no. watercourse crossings where culvert replacement works are potentially required are distributed within several local surface water bodies (i.e. impacts will not be concentrated within one surface water body) across a large geographical area (latitudinal distance of 28.9km);
- The small number (5 no.) of Class 1 and Class 2 watercourses will require culvert replacement works
- 79% of the culvert replacement works areas are at Drains (Class 4) or marginal watercourses (Class 3);
- The majority of the watercourses have been in some way altered by the fact they are already culverted under roads;
- The effects will typically be brief to temporary in nature and reversible with reinstatement of the watercourse channel; and,
- The works will not negatively affect the overall WFD surface water body status as the magnitude of effects will not be significant.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- No requirement for instream works – the existing culvert crossing will be used to access the lands.

Element 4: Upperchurch Windfarm

Impact Magnitude:
There will be a requirement for 1 no. watercourse crossings along the Upperchurch Windfarm access roads and no in-stream works will be required as a clear span bridge is consented as part of the Upperchurch Windfarm. Due to the relatively small number of watercourses being crossed and the fact that in-stream works will only be carried out in drains, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- A clear-span bridge will be used where 1 no. natural stream (Class 1 Watercourse) will be crossed and therefore no in-stream works will be required.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*

Evaluation of Other Cumulative Impacts – Morphological impacts to watercourses due to in-stream works

Whole UWF Project Effect

Cumulative Impact Magnitude: The morphological effects will be distributed between two regional catchments (River Suir and River Shannon) and within several local surface water bodies which is on a scale that makes the magnitude impact Small Adverse.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- The vast majority of the watercourse crossings along the UWF Grid Connection are already culverted;

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- The watercourse crossings required for the UWF Grid Connection are largely located within the River Shannon catchment while the watercourse crossings required for the UWF Related Works are largely located in the River Suir surface water catchment;
- No in-stream works are required for the Consented Windfarm; and,
- Therefore, the overall potential for in-combination morphological effects with regard to in-stream works is negligible to none.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.2.2.2.1).

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Sensitive Aspect

11.2.4.2 Impact Evaluation Table: Surface water quality impacts during conifer plantation tree felling

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Tree felling activities
Cumulative Impact Source: Tree felling activities
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Surface water quality impacts from sediment release in surface water runoff during coniferous felling operations. This presents a potential indirect impact on local surface water bodies as a result of entrained sediment in runoff from the felling works area.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface water quality impacts during conifer plantation tree felling

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:

Small areas of coniferous forestry at various locations along the Internal Windfarm Cabling and the Realigned Windfarm Roads will be permanently felled to facilitate construction in these areas. In total, 0.3 hectares of forestry will be felled, and all this will be within the River Suir catchment. Surface water quality effects have the potential to occur locally.

Due to the small scale of the overall felling and the fact that the felling areas are relatively remote from each other, the magnitude of impacts is considered to be Negligible**.**

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- Relatively small felling area proposed (0.3ha in total);
- The total felling area will be required at two separate locations (0.2ha and 0.1ha) with the works being completed at different times;
- All felling will be carried out under a tree felling license;
- All tree felling will be undertaken using good working practices as outlined by the Forest Service in their "Forestry Harvesting and Environment Guidelines (Forest Service, 2000a) and "Forestry and Water Quality Guidelines" (Forestry Service, 2000b) **Project Design Measure**; and,
- All effects will be localized, brief to temporary in duration and reversible

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Owenbeg_10 and Clodiagh_010 local surface water bodies (both within the River Suir regional catchment). Cumulative effects as a result of forestry felling only relates to UWF Related Works and Upperchurch Windfarm in these catchments – there is no forestry felling associated with either UWF Replacement Forestry or UWF Grid Connection. There is no potential for cumulative effects in either the Multeen_10 or Inch (Bilboa)_10 or Bilboa_010, as in-combination forestry felling will not occur in these catchments. There is no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works.

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As felling areas are relatively small and located across two sub-catchments, the effects will be localised, and the overall magnitude of impact is considered to be Negligible to Small Adverse. No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.
Significance of the Cumulative Impact: Imperceptible to Slight
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies; • The areas required for felling relating to the UWF Related Works (0.3ha) are small isolated areas that will be felled separate to the Upperchurch Windfarm felling (4.35ha), and therefore the potential for in-combination effects is negligible;
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection
Impact Magnitude: None
Significance of the Impact: No Potential for Impact
Rationale for Impact Evaluation: • No forestry felling associated with UWF Grid Connection
Element 3: UWF Replacement Forestry
Impact Magnitude: None
Significance of the Impact: No Potential for Impact
Rationale for Impact Evaluation: • The UWF Replacement Forestry is currently agricultural land, and therefore no tree felling is required. • The UWF Replacement Forestry will be a permanent woodland, therefore no harvesting will be required.
Element 4: Upperchurch Windfarm
Impact Magnitude: A total of 4.35ha will be felled to facilitate the construction of the Upperchurch Windfarm infrastructure (2013 EIS). The majority of the felling will be undertaken in the Clodiagh River catchment (River Suir). The impact of tree felling on water quality were assessed in Chapter 15 (Hydrology) of the 2013 EIS. The overall effects are assessed to be Not Significant.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The Sediment and Erosion Control Plan for the Upperchurch Windfarm has measures in place for control of sediment during tree felling, and therefore no significant effects are expected; and, • All tree felling will be undertaken using good working practices as outlined by the Forest Service in their "Forestry Harvesting and Environment Guidelines (Forest Service, 2000a) and "Forestry and Water Quality Guidelines" (Forestry Service, 2000b).
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*

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Evaluation of Other Cumulative Impacts – Surface water quality impacts during conifer plantation tree felling
Whole UWF Project Effect
Cumulative Impact Magnitude: The Whole UWF Project has the potential has the potential to impact on surface water bodies in the River Suir catchment only. Felling areas are relatively small and located across several sub-catchments, and therefore effects will be localised. Given that there is no forestry felling areas associated with the UWF Grid Connection or UWF Replacement Forestry, and that the tree felling required for the UWF Related Works is relatively small compared to the Upperchurch Windfarm tree felling area, the overall magnitude of impact is considered to be Negligible to Small Adverse.
Significance of the Cumulative Impact: Imperceptible to Slight
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies; • The areas required for felling relating to the UWF Related Works are small isolated areas that will be felled separate to the Upperchurch Windfarm felling, and therefore the potential for in-combination effects is negligible; • The area to be felling for the UWF Related Works accounts for only 7% of the Upperchurch Windfarm felling area; and, • No forestry felling required for UWF Grid Connection.
All Elements of the Whole UWF Project with Other Projects or Activities *- Please refer to Section 11.2.4.10 for cumulative evaluation*

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11.2.4.3 Impact Evaluation Table: Surface water quality impacts due to earthworks

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Earthworks/Storage of Overburden
Cumulative Impact Source: Earthworks/Storage of Overburden, Planting Works
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Indirect surface water quality impacts from entrained sediment in surface water runoff arsing during excavations and groundwork associated with the Internal Windfarm Cabling trench, Haul Route Works and Realigned Windfarm Roads and in relation to the UWF Grid Connection, the 110kV UGC trench (and ancillary works such as joint bays, new access road, temporary compound) and the Mountphilips Substation).

There will also be a requirement for temporary and permanent overburden storage areas along works area and these storage areas also have the potential to create entrained sediment in runoff as a result of their erosion. Temporary overburden storage areas relate to the movement of excavated material away from the excavation site and stored temporarily at a designated location for up to 1 week (typically 1 – 2 days). Permanent storage of overburden will be as berms along the works area.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface water quality impacts due to earthworks

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
The potential for water quality effects will arise during excavations required for the Internal Windfarm Cable trench (17.9km), temporary access roads (5.3km), Haul Route Works, Realigned Windfarm Raods and the Telecom Relay Pole works.

Up to 930m^3 of overburden will be permanently stored along the internal cabling route as linear berms and up to 10,850m^3 will be temporarily be stored for later reinstatement along the wind farm works area. It is possible that erosion of these storage areas could result in surface water quality impacts locally.

Due to the transient and spread out nature of the works around the windfarm site and the fact that most of the local watercourses are drains or marginal watercourses, the magnitude of impact is considered to be Small Adverse.

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

- As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- The majority of the works relating to the UWF Related Works are located within the Clodiagh River catchment, and therefore the potential for surface water quality impacts is higher than that of the 110kV UGC works;
- The overall significance of effects is reduced as the majority of the watercourses intercepted by the works are drains (Class 4 watercourse) with low flows or no flows, and therefore the effectiveness of them acting as a surface water flowpath to the more sensitive downstream surface water bodies is limited;
- The vast majority of the works area (with the exception of watercourse crossings) are located more than 50m from a watercourse;

Local Surface Water Bodies

Sensitive Aspect

- Only approximately 200m of the internal cabling will be completed in any one day (two crews completing up to 100m/day each);
- The earthworks required for the Haul Route Works and Realigned Windfarm Roads are distributed around the windfarm site, and works will be relatively localised in nature. This work will be completed in stages over 6 – 8 months;
- Temporary and permanent overburden storage areas are located more than 50 meters from a Class 1 and Class 2 watercourse (**Project Design Measure**);
- Temporary overburden storages will only remain in place for less than 1 week before the material is reinstated along construction works area and the next section of the cable trench excavation is started. Therefore, only relatively small volumes of material will be in temporary storage (and susceptible to erosion at any one time);
- The amount of overburden for permanent storage is relatively small, and the permanent storage berms will be seeded immediately after emplacement (**Project Design Measure**);
- The majority of the temporary overburden areas are located in grassland, and therefore the grass vegetation surrounding the storage areas acts as an effective natural vegetation filter for removal of potential suspended sediments;
- Approximately 62% of the Internal Windfarm Cabling will be installed within the Upperchurch Windfarm access roads, thereby reducing the need for additional excavations; and,
- Surface water quality effects will be localised to the works areas, brief to temporary in duration and reversible

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Multeen (East)_10 and the Owenbeg_10 and Clodiagh_010 local surface water bodies (all within the River Suir regional catchment), and the Inch (Bilboa)_10 and Bilboa_010 local surface water bodies in the River Shannon regional catchment.

Both UWF Related Works and Upperchurch Windfarm works will take place in the Multeen (East)_10 and Owenbeg_10 catchments, while UWF Related Works, Upperchurch Windfarm, UWF Replacement Forestry and UWF Grid Connection works will take place in the Clodiagh_010 catchment. Works associated with UWF Grid Connection, UWF Related Works and Upperchurch Windfarm will occur in the Inch (Bilboa)_10 and Bilboa_010 catchments.

In total up to 4,3850m^3 of overburden will be permanently stored and up to 5,5450m^3 will be temporarily stored for later reinstatement in the Suir regional catchment, (this overburden relates to UWF Related Works and Upperchurch Windfarm only). Whereas, in total up to 9,080m^3 of overburden will be permanently stored and up to 11,400m^3 will be temporarily stored for later reinstatement in the Shannon regional catchment (this overburden relates to UWF Related Works, Upperchurch Windfarm and for Mountphilips Substation and associated access road and End Masts for the UWF Grid Connection, all excavated material from the 110kV UGC trench in public roads will be removed to landfill). It is possible that erosion of these storage areas could result in surface water quality impacts locally.

Due to the transient and spread out nature of the UWF Related Works, Upperchurch Windfarm and UWF Grid Connection and the fact that three-quarters of the local watercourses, in either regional catchment, are drains or marginal watercourses, the magnitude of impact is considered to be Small Adverse.

There is no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works

Significance of the Cumulative Impact: Slight to Moderate

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water bodies;

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- While the majority of the UWF Related Works, the majority of Upperchurch Windfarm works, and all of the UWF Replacement Forestry, are located within the River Suir catchment, in-combination effects will be no greater than Slight to Moderate due to: the location of 62% of the Internal Windfarm Cabling within Consented UWF Roads which will reduce excavation requirements; the localised nature of effects from Haul Route Works and Realigned Windfarm Roads due to the scale of these works; imperceptible effects associated with UWF Replacement Forestry; and the implementation of the Sediment & Erosion Control Plan for the consented Upperchurch Windfarm;
- In-combination effects on surface water quality within the River Shannon are likely to be negligible due to the small extent of in-combination works in this catchment – i.e. the majority of UWF Related Works, Upperchurch Windfarm and UWF Replacement Forestry are located in the Suir catchment, which limits the potential for cumulative impacts.
- Temporary nature of the works

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

Element 1: UWF Grid Connection

Impact Magnitude:
Indirect surface water quality impacts from entrained sediment in surface water runoff arsing during excavations and groundwork and the storage of overburden associated with the Mountphilips Substation, access road and 110kV UGC trench in Coole and Mountphilips townlands. Excavations (totalling 22,210m^3) on the public road section of the 110kV UGC will not involve earthworks or storage of overburden, with all excavations from the trench being removed to landfill as spoil.

Approximately 3,770m^3 of overburden will be permanently excavated and stored along the construction works area boundary as linear berms at the Mountphilips Substation site in Coole and Mountphilips townlands.

It is possible that earthworks could result in negligible to small adverse surface water quality impacts locally.

Significance of the Impact: Imperceptible to Slight

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible to small adverse magnitude combined with the High Importance of the local surface water bodies;
- The work is spread out over a large geographical area (latitudinal distance of 28.9km) and within several local surface water bodies (i.e. Newport (Mulkear) River, Small River, Clare River, Bilboa River and Clodiagh River);
- The transient nature of the works (i.e. construction work will be carried out in stages over a period of 6 – 8 months within a very large geographical areas);
- The majority of the 110kv is along public roads;
- Due to the relatively small footprint area of the works at Mountphilips Substation the potential to generate large volumes of sediment in runoff is low; All material excavated from the construction works area at the Mountphilips Substation site will be either reinstated or removed for temporary or permanent storage at a suitable location 50m away from Class 1 and Class 2 watercourse (Project Design Measure);
- The permanent storage berms will be seeded immediately after emplacement (Project Design Measure); and,
- Surface water quality effects will be localised to the works areas, brief to temporary in duration and reversible

Element 3: UWF Replacement Forestry

Impact Magnitude:
The UWF Replacement Forestry area is approximately 6ha in area. The UWF Replacement Forestry drains to a headwater stream of the Clodiagh River. Tree planting will be completed by hand, and there will be no

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requirement for rill ploughing or any earthworks. The potential for the planting works to generate sediments in runoff is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The tree planting will be completed by hand, and therefore there will be no requirement for rill ploughing or any earthworks. The potential for the planting works to generate sediments in runoff is negligible;
- The riparian strips/grassland adjacent to the existing watercourse are to be maintained as part of the forestry layout as a water quality protection measure (Project Design Measure); and,
- All works will be completed as per the Forest Service best practice guidance in relation to water quality

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology Chapter) and the Sediment and Erosion and Control Plan from the 2013 EIS, release of sediment during the construction phase is likely to have a temporary negative effect locally during excavation work. The residual effects were considered to be Not Significant.

Impact Evaluation: Not Significant

Rationale for Impact Evaluation:

- The upland nature of the site (remote from the main local streams and rivers) and the small number of drainage features within the site;
- A 50m watercourse buffer zone will be maintained from the limited number of sensitive watercourses at the site (Class 1 and Class 2 watercourses) and 20m from drains (Class 3 and Class 4);
- All temporary and permanent overburden will be located more than 50m from a watercourse; and,
- The measures outlined in the EIS and within the Sediment and Erosion and Control Plan will ensure the development of the wind farm will not have a significant impact on the surface water quality.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

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

Other Project: Consented Bunkimalta Windfarm

- Please refer to Section 11.2.4.10 for cumulative information

Evaluation of Other Cumulative Impacts – Surface water quality impacts due to earthworks

Whole UWF Project Effect

Cumulative Impact Magnitude:
The Whole UWF Project has the potential to impact on surface water bodies in both the River Shannon and River Suir catchments. The localised effects are likely to be transient in nature.

The overall magnitude of impacts is considered to remain at Small Adverse given the transient nature of the works which will be distributed over a large geographical area and within two separate regional surface water catchments.

Significance of the Cumulative Impact: Slight to Moderate

Water

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Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- The majority of the 110kV UGC is contained within the River Shannon catchment while the majority of the Upperchurch Windfarm and UWF Related Works, including all of the UWF Replacement Forestry are located in the River Suir catchment. Therefore, the in-combination effects on surface water quality within the River Shannon are likely to be negligible;
- The majority of the Upperchurch Windfarm and UWF Related Works, including all of the UWF Replacement Forestry, are located within the River Suir catchment. However, as a large portion of the Internal Windfarm Cabling is within the Upperchurch Windfarm roads (i.e. reduced excavation requirements), the imperceptible effects of the UWF Replacement Forestry and that the effects of the Haul Route works and Realigned Windfarm Roads are likely to be localised, no significant in-combination effects to the River Suir are expected (i.e. in-combination effects of Slight to Moderate); and,
- Works relating to the Upperchurch Windfarm, UWF Related Works and the UWF Replacement Forestry will be completed over a period of 6 – 8 months.

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

- *Please refer to Section 11.2.4.10 for cumulative evaluation*

Local Surface Water Bodies

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11.2.4.4 Impact Evaluation Table: Water quality impacts from dewatering of excavations

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Dewatering
Cumulative Impact Source: Excavation Dewatering
Impact Pathway: Runoff and surface water flowpaths

Impact Description: There will be a requirement to have the cable trenches and foundation excavations dry prior adding of the granular cement. Any pumped water (from potential groundwater inflows and surface water inflows) will likely have high levels of sediments and therefore has the potential to impact on local surface water quality.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Water quality impacts from dewatering of excavations

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Trial holes undertaken as part of the 2013 windfarm EIS investigations reported no groundwater inflows in any of the 20 no. trial pits undertaken. Localised impacts may occur as a result of pumping out surface water inflows during very wet periods. The magnitude of effects is likely to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The elevated nature of the Internal Windfarm Cabling route and shallow excavation works means significant groundwater inflows are not expected (the 20 no. trial holes undertaken at the windfarm site indicate this also);
- Excavation dewatering with respect to the cable trench is likely to be only be required if there was significant surface water inflows into the trench following heavy rainfall;
- There will be no direct discharge of pumped water into any watercourse or drain (**Project Design Measure**);
- All effects will be localized, brief to temporary in duration and reversible.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Multeen (East)_10 and the Owenbeg_10 and Clodiagh_010 local surface water bodies (all within the River Suir regional catchment), and the Inch (Bilboa)_10 and Bilboa_010 local surface water bodies in the River Shannon regional catchment.

No significant excavation dewatering is expected for Internal Windfarm Cabling or the Upperchurch Windfarm. No significant dewatering requirement is anticipated for the 110Kv UGC as the route is mainly within the carriageway of public roads and most of the watercourse crossings are culverted or will be crossed by bridges.

Effects associated with excavation dewatering will be rare, isolated within separate catchments and brief in duration if they occur and therefore the in-combination magnitude of effect is considered to be Negligible.

Topic: Water

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- Shallow nature of excavations, combined with the upland location of most UWF Related Works and Upperchurch Windfarm works areas;
- No significant dewatering requirement is anticipated along the 110kv UGC as the cable will mainly be installed within the carriageway of public roads;
- There will be no direct discharge of pumped water into any watercourse or drain (Project Design Measure); and,
- All pumped water from the Upperchurch Windfarm works will be captured and treated prior to release away from local watercourses.

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

Element 1: UWF Grid Connection

Impact Magnitude:
The majority of the UWG Grid Connection is along the carriageway of public roads and therefore significant groundwater or surface water inflows into the cable trench are not anticipated. Existing road drainage is likely to limit any significant inflows into the trench.

Given that any pumped water will be treated and then discharged at a location away from any local watercourses (Project Design Measure), the effects are likely to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- There will be no direct discharge of pumped water into any watercourse or drain (Project Design Measure). All pumped water will be treated using a mobile water treatment train and a silt bag prior to discharge along the roadside verge;
- The route of the 110kv is largely along the carriageway of public roads and therefore significant trench dewatering is not anticipated;
- Along sensitive areas of the 110kv route (i.e. where the smaller watercourses being crossed drain directly into the Clare River (W8 – W31) and the Bilboa River (W41 – W48)), trench work will only be completed during the spring/summer months when ground conditions are typically dryer (Project Design Measure);
- All existing roadside drains/drainage routes within the trench works area will be temporarily blocked to capture any pumped water / surface water runoff and a row of silt fencing will be placed along the downslope verge of the road (Project Design Measure);
- Works will not be completed during extreme or prolonged rainfall events in order reduce the risk of surface water inflows into the trench; and,
- All effects will be localised, brief to temporary in duration and reversible

Element 3: UWF Replacement Forestry

Impact Magnitude: None

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Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- No excavations will be undertaken, and therefore there will be no requirement for dewatering

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology) of the 2013 EIS, limited and discontinuous seepage is expected from the sides of the turbine bases in sloping ground, and this is more likely to occur wetter winter periods.

Significance of the Impact: Not Significant.

Rationale for Impact Evaluation:

- The lack of significant groundwater inflows:
- Use of interceptor drainage to prevent runoff entering excavations;
- All pumped water will be captured and treated prior to release; and,
- There will be direct discharge of treated pumped water into the existing drainage network.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

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

Other Project: Consented Bunkimalta Windfarm

- Please refer to Section 11.2.4.10 for cumulative information

Evaluation of Other Cumulative Impacts– Water quality impacts from dewatering of excavations

Whole UWF Project Effect

Cumulative Impact Magnitude:
No significant excavation dewatering is expected for the UWF Grid Connection, Internal Windfarm Cabling or the Upperchurch Windfarm. Effects associated with excavation dewatering will be rare, isolated within separate catchments and brief in duration if they occur and therefore the in-combination magnitude of effect is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- Location of the 110kV UGC within public roads, thereby reducing the potential for inflows into excavations;
- Significant in-combination effects from excavation dewatering is not expected to occur within the River Suir catchment as a result of the Consented UWF Turbine works, or the Internal Windfarm Cabling works as no
  significant groundwater pumping is expected; and,
- All pumped water from the Upperchurch Windfarm works will be captured and treated prior to release away from local watercourses.

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

- *Please refer to Section 11.2.4.10 below*

11.2.4.5 Impact Evaluation Table: Surface Water Quality Impacts due to Watercourse Crossing Works

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Watercourse crossing works
Cumulative Impact Source: Watercourse crossing works
Impact Pathway: Surface water flowpaths

Impact Description: Direct surface water quality impacts as a result of sediment release during in-stream works such as open trenching for the cabling and culvert emplacement / replacement and indirect surface water quality impacts from working area runoff and pumped water from the in-stream open trench dewatering works.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface Water Quality Impacts due to Watercourse Crossing Works

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, 26 no. of the total 32 no. crossings are located within the Clodiagh River catchment, 5 no. in the Owenbeg, and 1 no. in the Bilboa. In-stream works will be required at 25 no. of these locations – 22 no. in the Clodiagh and 3 in the Owenbeg. There will be no instream works in the Bilboa catchment for UWF Related Works.

Due to the relatively minor nature of the watercourses being crossed (with most being only drains) and the distributed and transient nature of the works within the local surface water catchments, the magnitude of impact is considered to be Negligible to Small Adverse**.**

Significance of the Impact: Imperceptible to Slight

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- 75% of the in-stream works areas are at drains (Class 4) or marginal watercourses (Class 3);
- The drains (Type 4) and marginal watercourses (Type 3) have typically no flows or very low flows, and therefore the effectiveness of them acting as a surface water flowpath to more important downstream surface water bodies are limited;
- The Class 1 and Class 2 watercourses where in-stream works are required only amount to 5 no. and these are largely small headwater streams;
- 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**) and therefore flows are likely to be very low;
- 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**). This will be completed by over pumping, flume (pipe) or diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (**Project Design Measure**);
- Only between 1 and 2 watercourse crossings will be completed in any one day (2 construction crews will be working on the UWF Related Works);
- The works will not negatively affect the overall surface water body status, and the magnitude of impact will not be significant; and,

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- All effects will be localised, brief in nature and reversible.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is no potential for effects with Upperchurch Windfarm or UWF Replacement Forestry as neither of these projects require instream works. There may be up to 5 culvert replacement works (small existing culverts on drains which may require replacement) required for UWF Grid Connection in the Clodiagh_010 in the Suir catchment, 22.no instream works are required for UWF Related Works in this waterbody.

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Water quality effects, which are likely to be localised), will have a magnitude of impact Negligible to Small Adverse

Significance of the Cumulative Impact: Imperceptible to Slight

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- No instream works for Upperchurch Windfarm or UWF Replacement Forestry;
- Small number of culverts (5) which may need replacing (and therefore instream works) for UWF Grid Connection in the Suir regional catchment;
- No potential for UWF Related Works to cause cumulative effects, due to watercourse crossing works, within the River Shannon catchment;
- The works will not negatively affect the overall surface water body status in the Suir catchment because most of the watercourse crossings are drains.

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

Element 1: UWF Grid Connection

Impact Magnitude:
There are 63 no. watercourse crossings along the 110kV UGC, culvert replacement works potentially will be required at 31 no. of these locations. Surface water quality effects at each crossing are likely over the duration of the works (2-3 days per watercourse).

Due to the fact that most of the watercourse crossings along the UWF Grid Connection are existing culverts and bridges, and the distributed and transient nature of the works within several local surface water bodies over a relatively large geographical area, the magnitude of impact is considered to be Negligible to Small Adverse.

Significance of the Impact: Imperceptible to Slight

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- Culvert replacement works will only be required at 49% of the crossing locations (31 no. of 63);
- 79% of the culvert replacement works areas are at drains (Class 4) or marginal watercourses (Class 3);
- The drains (Class 4) and marginal watercourses (Class 3) have typically low flows or no flows, and therefore the effectiveness of them acting as surface water flowpaths to more sensitive downstream surface watercourses are limited;
- 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);
- Any culvert replacement works in Class 1 and Class 2 watercourses will be carried out during July – September when flows are likely to be low;

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- The culvert replacement 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);
- Only between 1 and 6 watercourse crossings will be completed in any one day (6 construction crews will be working on the UWF Grid Connection route) over the entire length of the UWF Grid Connection (28.9km);
- The watercourse crossings required for the 110kV UGC are distributed across several local surface water bodies over a large geographical area (latitudinal distance of 28.9km);
- The works will not negatively affect the overall surface water body status; and,
- All effects will be localised, brief in nature and reversible.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

No watercourse crossing works required.

Element 4: Upperchurch Windfarm

Impact Magnitude: The water quality effects of in-stream with regard to the Upperchurch Windfarm were not assessed directly in 2013 EIS. However, the EIS concludes that over water quality effects will not be significant. The potential impacts are further evaluated below for the purpose of assessing in-combination effects.

There will be a requirement for 1 no. watercourse along the Upperchurch Windfarm access roads and in-stream works will not be required as a free span bridge is consented.

Due to the relatively small number of watercourses being crossed and the fact that in-stream works will only be carried out in drains, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- 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.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

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

Other Project: Consented Bunkimalta Windfarm

- Please refer to Section 11.2.4.10 for cumulative information

Local Surface Water Bodies

Sensitive Aspect

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Local Surface Water Bodies

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Evaluation of Other Cumulative Impacts – Surface Water Quality Impacts due to Watercourse Crossing Works
Whole UWF Project Effect
Cumulative Impact Magnitude: The water quality effects, which are likely to be localised), will be dispersed between two regional catchments and within several local sub-catchments which is on a scale that makes the magnitude of impact Negligible to Small Adverse.
Significance of the Cumulative Impact: Imperceptible to Slight
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies; • 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 potential for in-combination effects within the River Suir catchment as a result of the UWF Related Works watercourse crossings is negligible as most of the crossings are at drains with no or flows and therefore the effectiveness of them acting as a surface water flowpath to more important downstream surface water bodies to create in-combination effects is negligible; • The watercourse crossings relating to the Upperchurch Windfarm and UWF Related Works will be completed over a period of 6 – 8 months; and, • The works will not negatively affect the overall surface water body status, and the magnitude of impact will not be significant.
All Elements of the Whole UWF Project with Other Projects or Activities - *Please refer to Section 11.2.4.10 for cumulative evaluation*

Topic: Water

11.2.4.6 Impact Evaluation Table: Surface Water Impacts due to Contamination by Fuels, Oils and Chemicals

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Oils, Fuels and Chemicals
Cumulative Impact Source: Oils, Fuels and Chemicals
Impact Pathway: Runoff and surface water flowpaths

Impact Description: The plant and equipment that will be used during the construction phase will be run on fuels and oils. This creates the potential for spillage and leakage of hydrocarbons from plant during refuelling or storage of oils and fuels which can impact on downstream surface water bodies.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface Water Impacts due to Contamination by Fuels, Oils and Chemicals

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Plant and equipment will be used at all the works areas and therefore surface water bodies along the whole route are a potential receptor. However, any spills or leaks are likely to be minor (worst case) and therefore indirect effects are likely to be localised.

Given the transient and distributed nature of the works and the fact that only small volumes will be present on-site at one time, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- Only relatively small volumes of fuels / oils will be on-site at any one time and therefore no significant effects are expected;
- All fuels required for construction activities will be stored in a designated location, away from main traffic activity, within the Temporary Compounds. All fuel will be stored in bunded, locked storage containers (**Project Design Measure**);
- There will be no refuelling of plant or machinery permitted within 100m of a Class 1 or Class 2 water-course (**Project Design Measure**);
- All chemical wastes will be stored in secure, bunded and covered storage containers, in a designated se-cure part of the Temporary Compounds, and will be removed from site and transported to an approved licensed facilities (**Project Design Measure**);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may occur along UWF Related Works areas; and,
- Any effects that do occur will be very localised to the soils and subsoils at the source / works activity area.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Multeen (East)_10 and the Owenbeg_10 and Clodiagh_010 local surface water bodies (all within the River Suir regional catchment), and the Inch (Bilboa)_10 and Bilboa_010 local surface water bodies in the River Shannon regional catchment. Effects from oil and fuel usage are likely to occur rarely and be isolated incidents.

Local Surface Water Bodies

Sensitive Aspect

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Given the distributed nature of the works within several local sub-catchments and the fact that only small volumes of fuel/oil will be present on-site at any one time, the in-combination magnitude of effect is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- the distributed nature of the works within several local sub-catchments and the fact that only small volumes of fuel/oil will be present on-site at any one time;
- A Fuel and Oil Management Plan is proposed for the Upperchurch Windfarm which will include storage requirements and emergency procedures for dealing with any spills and leaks;
- The additional volumes of oils and fuels that will be present on the Upperchurch Windfarm site as a result of the UWF Related Works will be negligible;
- The UWF Replacement Forestry is not likely to contribute to in-combination effects with respect to impacts from oils and fuels; and,
- Effects are likely to be due to small isolated localised spills (worst case) that are very unlikely to contribute to in-combination water quality effects within the local surface water catchments.

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

Element 1: UWF Grid Connection

Impact Magnitude: Plant and equipment will be used at all UWF Grid Connection construction works areas and therefore surface water bodies along the whole route are a potential receptor. However, any spills or leaks are likely to be minor (worst case) and therefore indirect effects are assessed to be localised and temporary. Given the transient and distributed nature of the works over several catchments along with the fact that only small volumes will be present on-site at one time, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- Only relatively small volumes of fuels / oils will be on-site at any one time and therefore no significant effects are expected;
- All fuels required for 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 (Project Design Measure);
- Overnight parking of plant and machinery will only be permitted at the temporary compound, and this reduces the risk posed by leaks (Project Design Measure);
- All chemical wastes will be stored in secure, bunded and covered storage containers, in a designated secure part of the Temporary Compound, and will be removed from site and transported to an approved licensed facilities (Project Design Measure);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may occur along the UWF Grid Connection construction works area; and,
- Any effects that do occur will be very localised to the soils and subsoils at the source / works activity area.

Element 3: UWF Replacement Forestry

Impact Magnitude:

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Plant and equipment used for the UWF Replacement Forestry works will be limited to 4 x 4 jeeps. Given the small-scale nature of the works and the fact that no refuelling or storage of fuels will be undertaken on site, the magnitude of impact is considered to be Negligible.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • Small scale of works • No refuelling or storage of fuels • Vehicles limited to 4 x 4 jeeps
Element 4: Upperchurch Windfarm
Impact Magnitude: Based on Chapter 15 (Hydrology Chapter) the potential for water quality effects arises from the use and storage of oil and fuels which could result in spills and leaks. The effects were considered to be Not Significant.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • A Fuel and Oil Management Plan is proposed which will storage requirements and emergency procedures for dealing with any spills and leaks.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*
Evaluation of Other Cumulative Impacts – Surface Water Impacts due to Contamination by Fuels, Oils and Chemicals
Whole UWF Project Effect
Cumulative Impact Magnitude: The Whole UWF Project has the potential to impact on surface water bodies in both the River Shannon and River Suir catchments from oil and fuel usage. Effects are likely to occur rarely and be isolated incidents. Given the distributed nature of the works within two regional surface water catchments and over several local sub-catchments and the fact that only small volumes of fuel/oil will be present on-site at any one time, the in-combination magnitude of effect is considered to be Negligible.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies; • The potential for in-combination effects with the 110kV UGC within the River Shannon surface water catchment are negligible as the vast majority of the Consented UWF Turbine, and the UWF Related Works are within the River Suir catchment; • A Fuel and Oil Management Plan is proposed for the Upperchurch Windfarm which will include storage requirements and emergency procedures for dealing with any spills and leaks; • The additional volumes of oils and fuels that will be present on the Upperchurch Windfarm site as a result of the UWF Related Works will be negligible; • The UWF Replacement Forestry is not likely to contribute to in-combination effects with respect to impacts from oils and fuels; and, • Effects are likely to be due to small isolated localised spills (worst case) that are very unlikely to contribute to in-combination water quality effects within the local surface water catchments.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.2.2.2.1).

Local Surface Water Bodies
Sensitive Aspect

11.2.4.7 Impact Evaluation Table: Water Quality Impacts from Cement Based Compounds

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Cement Based Compounds Cumulative Impact Source: Cement Based Compounds Impact Pathway: Runoff and surface water flowpaths Impact Description: Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses rep-resents a risk to the aquatic environment. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Water Quality Impacts from Cement Based Compounds	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: The use of cement-based compounds will be limited to the Telecom Relay Pole foundation (c.4m^3) and to the 9 no. of public road crossings, the magnitude of impact is considered to be Negligible.	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation: • Small scale of concrete use.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: The potential for cumulative effects is limited to the waterbody in which the Telecom Relay Pole is located – i.e. Clodiagh River catchment in the Suir regional catchment. Effects are likely to occur occasionally and be isolated incidents. Other works involving cement in this catchment include concrete in the UWF Grid Connection 110kV UGC and for Consented UWF Turbine foundations and for the Consented UWF Substation. No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works. Given the relatively small volumes of cement will be present on-site at any one time, the in-combination magnitude of effect is considered to be Negligible	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies; • The relatively small volumes of cement on-site at any one time with the potential to cause surface water quality impacts will be small; • The use of concrete for the UWF Related Works is negligible, and impacts on surface water quality are not expected; and,	

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- Concrete Control Procedures will be included in the Environmental Management Plan for the Upper-church Windfarm, and therefore no significant in-combination effects with respect to the UWF Related Works are expected.

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

Element 1: UWF Grid Connection

Impact Magnitude:
Concrete will be used mainly in the 110kV UGC trench and for the Mountphilips Substation building foundations and therefore surface water bodies along the whole route are a potential receptor. However, any spills or leaks are likely to only occur occasionally with incidents being small and isolated.

Given the transient and distributed nature of the works over several local surface water bodies, the fact that only relatively small volumes of cement will be placed at any particular time and that the cement inside the cable trench will be backfilled every 100m or so, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- No batching of wet cement is proposed on-site, and therefore significant volumes will not be present on-site at any one time (Project Design Measure);
- The most widespread use of cement will be in the 110kV UGC trench. Cement and possible runoff will be contained within the excavation by nature of a 1.2m deep trench, and therefore the risk to local surface water bodies is low;
- Semi-dry granular cement will be used in the cable trench, and wet cement will only be used for substation and end mast foundation construction. Semi-dry granular cement will limit the mobility of the compound through potentially porous soil thereby restricting the effects to the contact area (Project Design Measure);
- Prior to importing cement, all existing roadside drains and other drainage pathways will be temporarily blocked along sections of the 110kv route that overlap the SAC (Project Design Measure);
- All cement placed within the 110kV UGC trench will be backfilled
before the next section of the trench commence and therefore is low risk of cement washout from the trench;
- Precast concrete structures will only be used at joint bays and at culvert watercourse crossing locations as required (Project Design Measure);
- Therefore, impacts that do arise (worst case) will largely be limited to small, isolated, low volume spills during emplacement of the cement within the cable trench; and,
- Any effects that do occur will be very localised to the source / works activity area.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- No requirement to use cement at the UWF Replacement Forestry site.

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology) of the 2013 EIS, there is a risk of spillage and runoff from cement during placing of concrete and also during washing out of chutes. Concrete will be used at the 22 no. turbine bases and also at the substation compound.

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Sensitive Aspect

Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • During pouring containment measures will be put in place to keep cement within the foundation area and prevent it entering the local drainage routes; and, • Washing of trucks will be limited to the chutes, and a dedicated concrete washout area will be available on-site.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*
Evaluation of Other Cumulative Impacts – Water Quality Impacts from Cement Based Compounds
Whole UWF Project Effect
Cumulative Impact Magnitude: The Whole UWF Project has the potential has the potential to impact on surface water bodies in both the River Shannon and River Suir catchments from cement-based compounds Effects are likely to occur occasionally and be isolated incidents. Given the distributed nature of the works within two regional surface water catchments and over several local sub-catchments and the fact that only relatively small volumes of cement will be present on-site at any one time, the in-combination magnitude of effect is considered to be Negligible to Small Adverse.
Significance of the Cumulative Impact: Imperceptible to Slight
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies; • The potential for in-combination effects with the 110kV UGC within the River Shannon surface water catchment are negligible as the vast majority of the Consented UWF Turbines, and the UWF Related Works are within the River Suir catchment; • All cement placed within the 110kV UGC cabling trench will be backfilled before the next section of the trench commence. Therefore, the volume of cement on-site at any one time with the potential to cause surface water quality impacts will be small; • The use of concrete for the UWF Related Works is negligible, and impacts on surface water quality are not expected; and, • Concrete Control Procedures will be included in the Environmental Management Plan for the Upper-church Windfarm, and therefore no significant in-combination effects with respect to the UWF Related Works are expected.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.2.2.2.1).

Topic: Water

11.2.4.8 Impact Evaluation Table: Increased flood risk

Impact Description	
Project Life Cycle Stage:	Operational Stage

Impact Source: Permanent Access Roads and Hardstanding and new culverts
Cumulative Impact Source: Permanent Access Roads and Hardstanding and new culverts
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Increased flood risk in local watercourses due to runoff from permanent hardstanding surfaces (which may result in increased flow in local watercourses) and restrictions/changes in surface water flow as a result of new permanent culvert crossings being potentially undersized and causing a backup of flow

Impact Quality: Negative

Evaluation of the Subject Development Impact – Increased flood risk

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Permanent infrastructure associated with the UWF Related Works will be limited to 0.6km of Realigned Windfarm Access Road. Runoff from these surfaces may result in increased flow in local watercourses.
There are 9 no. permanent watercourse crossings required for the UWF Related Works, which potentially could cause localised flooding if undersized.

Due to the fact that all permanent hardstanding will have runoff control measures and that all permanent culverts will be sized for peak flood flows (**Project Design Measure**), the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;

Hardstanding Runoff:

- The footprint area of the Realigned Windfarm Roads is negligible compared to the area of the local surface water body. Therefore, runoff effects would be negligible; and,
- Drainage from the Realigned Windfarm Roads will be within the capture zone of the Upperchurch Windfarm drainage system which will provide attenuation.

New Permanent Culvert Crossings:

- All permanent culverts will be sized to cope with a minimum 100-year flood event (**Project Design Measure**);
- At a minimum, all pipe culverts will be 900mm in diameter regardless of the anticipated flood flow (i.e. minimum 900mm culvert will be used in drains regardless if flows are low), (**Project Design Measure**);
- All the culverts on Class 1 and Class 2 type watercourses will be bottomless/clear spanning (**Project Design Measure**); and,
- As agreed during a telephone consultation carried out by the EIA Coordinator with OPW, Limerick office, (February 2018), a Section 50 application will be submitted to the OPW for new crossings and upgrades following the receipt of planning permission for the UWF Grid Connection. The Section 50 applications will be accompanied by a hydraulic assessment of the new crossing structures to ensure they are adequate from a flood prevention perspective.

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Sensitive Aspect

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative impacts relates to the combined effect of new permanent hardstanding for UWF Related Works (Realigned Windfarm Roads and Telecom Relay Pole compound) and Upperchurch Windfarm (Consented UWF Roads, Consented UWF Turbine hardstanding areas, Consented UWF Substation compound), along with the 9 No. new permanent watercourse crossing structures which will be constructed for UWF Related Works. Due to the distributed nature of the works across several local surface water bodies and the fact that all permanent hardstanding will have runoff control measures and that all permanent culverts will be sized for peak flood flows, the magnitude of the cumulative impact is considered to be Negligible.

The UWF Grid Connection does not require any new permanent hardstanding areas in the Bilboa or Clodiagh catchments, and any replaced culverts will be appropriately sized, the cumulative impact is considered to be Negligible.

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The extremely small size of the Telecom Relay Pole compound (5m x 5m);
- The additional access roads associated with the Realigned Windfarm Roads replace lengths of access road that were already consented and therefore larger effects than the 3 permitted roads are anticipated;
- Drainage from the Realigned Windfarm Roads will be within the capture zone of the Upperchurch Windfarm drainage system, and therefore attenuation will be provided; and,
- All new watercourse crossing culverts will be adequately designed to accommodate any anticipated peak flood flows.

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

Element 1: UWF Grid Connection

Impact Magnitude:
Permanent infrastructure for UWF Grid Connection relates to the Mountphilips Substation compound area, and the associated new access road. Runoff from these surfaces may result in increased flow in local watercourses. There are 2 no. permanent watercourse crossings along the route of the new access road. In addition, there are potentially 31 no. existing culverts under the public road which may need to be replaced. Any new culverts installed could cause localised flooding if undersized.

Due to the distributed nature of the works over a large geographical area, the fact that all permanent hardstanding will have runoff control measures and that all permanent culverts will be sized for peak flood flows (Project Design Measure), the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;

Hardstanding Runoff:

- The permanent hardstanding areas are negligible in comparison to the area of the local surface water body;
- The permanent access road at Coole/Mountphilips will have permanent road side drains in place which will include check dams for reduction of runoff rates (Project Design Measure); and,

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- The Mountphilips Substation will have a permanent surface water drainage network in place which will allow for surface water attenuation (Project Design Measure).

New Permanent Culvert Crossings:

- All permanent culverts and replaced culverts will be sized to cope with a minimum 100-year flood event (Project Design Measure);
- At a minimum, all pipe culverts will be 900mm in diameter regardless of the anticipated flood flow (i.e. minimum 900mm culvert will be used in drains regardless if flows are low), (Project Design Measure);
- All the culverts on Class 1 and Class 2 type watercourses will be bottomless/clear spanning (Project Design Measure); and,
- As agreed during a telephone consultation carried out by the EIA Coordinator with OPW, Limerick office, (February 2018), a Section 50 application will be submitted to the OPW for new crossings and upgrades following the receipt of planning permission for the UWF Grid Connection. The Section 50 applications will be accompanied by a hydraulic assessment of the new crossing structures to ensure they are adequate from a flood prevention perspective.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- There are no new access roads, no permanent hardstanding areas or new culverts required for the UWF Replacement Forestry

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology) of the 2013, there is a risk of increased runoff to downstream watercourses from impermeable surfaces. The effects were assessed to be Not Significant.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The total footprint of the permanent hardstanding and associated increase in runoff is negligible in the context of local surface water catchment area; and,
- A Sediment and Control Plan will be in place during the operational stage for runoff attenuation.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*

Evaluation of Other Cumulative Impacts – Increased flood risk

Whole UWF Project Effect

Cumulative Impact Magnitude:
Due to the distributed nature of the works within separate regional catchments and across several local surface water bodies and the fact that all permanent hardstanding will have runoff control measures and that all permanent culverts will be sized for peak flood flows, the magnitude of impact is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The permanent hardstanding areas associated with the 110kV UGC (Shannon) and the UWF Related Works (Suir) are in separate regional surface water catchments, and therefore there is no potential for in-combination effects;

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- The additional access roads associated with the Realigned Windfarm Roads more or less replace the stretches of access road that were already consented and therefore no significant in-combination effects are anticipated;
- Drainage from the Realigned Windfarm Roads will be within the capture zone of the Upperchurch Windfarm drainage system, and therefore attenuation will be provided; and,
- All new watercourse crossing culverts will be adequately designed to accommodate any anticipated peak flood flows.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.2.2.2.1).

Topic

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11.2.4.9 Impact Evaluation Table: Surface Water Quality Impacts due to Runoff from Permanent Hardstanding Surfaces

Impact Description	
Project Life Cycle Stage:	Operational Stage
Impact Source: Permanent Access Roads and Hardstanding Cumulative Impact Source: Permanent Access Roads and Hardstanding Impact Pathway: Runoff and surface water flowpaths Impact Description: Surface water quality impacts from entrained suspended sediments in stormwater run-off as a result of the erosion of permanent hardstanding surfaces. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Surface Water Quality Impacts due to Runoff from Permanent Hardstanding Surfaces	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: Permanent infrastructure associated with the UWF Related Works will be limited to 0.6km of Realigned Windfarm Road and the Telecom Relay Pole. Runoff from these surfaces may generate sediments which could end up in local surface watercourses. Due to the fact that the permanent footprint associated with the UWF Related Works is negligible in comparison to the local catchment and that runoff from the works will be contained within the Upperchurch Windfarm Drainage, the magnitude of impact is considered to be Negligible.	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies; • The footprint area of the Realigned Windfarm Roads is negligible compared to the area of the local surface water body (<1%) therefore any water quality effects would be negligible; and, • Drainage from the Realigned Windfarm Roads will be within the capture zone of the Upperchurch Windfarm drainage system, and therefore any surface water quality effects will be negligible.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: The potential for cumulative impacts relates to the combined effect of new permanent hardstanding for UWF Related Works (Telecom Relay Pole and Realigned Windfarm Roads) and Upperchurch Windfarm (Consented UWF Turbines and Consented UWF Substation, and Consented UWF Roads). There is no potential for cumulative impacts with UWF Grid Connection or UWF Replacement Forestry due to the absence of permanent hardstanding in the local waterbodies affected by UWF Related Works. Due to the distributed nature of the works within across several local surface water bodies and the fact that all permanent hardstanding will have runoff control measures and that all permanent culverts will be sized for peak flood flows, the magnitude of the cumulative impact is considered to be Negligible. No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.	
Significance of the Cumulative Impact: Imperceptible	

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Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- the distributed nature of the works within several local sub-catchments
- The additional access roads associated with the Realigned Windfarm Roads more or less replace the stretches of access road that were already consented and therefore no significant in-combination effects are anticipated;
- Drainage from the Realigned Windfarm Roads will be within the capture zone of the Upperchurch Windfarm drainage system, and therefore attenuation will be provided.

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

Element 1: UWF Grid Connection

Impact Magnitude:
Permanent infrastructure will consist of the Mountphilips Substation compound area and access road. Runoff from these surfaces may generate sediments which could end up in local surface watercourses.
Due to the relatively small scale of new permanent hardstanding infrastructure within the local catchments and the fact that silt control measures will be included at all permanent hardstanding areas (Project Design Measure), the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The Mountphilips Substation and new access road will have a permanent surface water drainage network in place which will include a settlement pond for removal of sediment (Project Design Measure).

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- There are no new permanent hardstanding areas at the UWF Replacement Forestry

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology) of the 2013 EIS, there is a risk of surface water quality impacts during the operational stage as a result of suspended sediments from road and hardstand drainage.

Significance of the Impact: Not Significant

- Rationale for Impact Evaluation:
- A Sediment and Control Plan will be in place during the operational stage, and this will include inspection and maintenance of drainage along with regular environmental water quality audits.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.2.2.2.1*

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Cumulative Information: Individual Evaluations of Other Projects or Activities

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

Other Project: Consented Bunkimalta Windfarm
- Please refer to Section 11.2.4.10 for cumulative information

Evaluation of Other Cumulative Impacts – Surface Water Quality Impacts due to Runoff from Permanent Hardstanding Surfaces

Whole UWF Project Effect

Cumulative Impact Magnitude:
Due to the distributed nature of the works within separate regional surface water catchments and across several catchments over a large geographical area, the relatively small permanent footprint within individual catchments and the fact that silt control measures will be included at all permanent hardstanding areas, the magnitude of impact is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The permanent hardstanding areas associated with the 110kV UGC (Shannon) and the UWF Related Works/Upperchurch Windfarm (Suir) are in separate regional surface water catchments, and therefore there is no potential for in-combination effects;
- The additional access roads associated with the Realigned Windfarm Roads works more or less replace the stretches of access road that were already consented, and therefore no significant in-combination effects are anticipated; and,
- All new permanent hardstanding for UWF Grid Connection will have a permanent surface water drainage network in place;
- Drainage from the Realigned Windfarm Roads and Telecoms Relay Pole will be within the capture zone of the Upperchurch Windfarm drainage system, and therefore any surface water quality effects will be negligible.

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

- *Please refer to Section 11.2.4.10 for cumulative evaluation*

Local Surface Water Bodies

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11.2.4.10 Cumulative Impacts Evaluation on Local Surface Water Bodies: Surface Water Quality Effects from Suspended Sediments

Evaluation of UWF Related Works - Excluded: There is no potential for UWF Related Works to cause cumulative effects to surface water quality with the Bunkimalta Windfarm, as this Other Project is not located within the same local surface water bodies as the UWF Related Works (i.e. Clodiagh, Turraheen, Owenbeg and Inch (Bilboa)).

However, the Other Elements must be considered because UWF Related Works is part of a whole project. Therefore, the cumulative information and evaluation for the Other Elements of the Whole UWF Project are included in this Impact Evaluation Table, in order to show the totality of the project.

Sensitive Aspect:	**Local Surface Water Bodies - Clare River (Annagh River) Catchment**
Impact:	**Surface Water Quality Effects from Suspended Sediments**
Cumulative Impact Description	
Project Stage	Construction Stage of UWF Grid Connection
Cumulative Source: Tree felling, Earthworks and Watercourse Crossing Works Cumulative Impact Description: Indirect surface water quality impacts on the Clare (Annagh) River as a result of watercourse crossings, earthworks, groundworks and storage of overburden associated with the UWF Grid Connection (110kV UGC) element of the Whole UWF Project, and the Bunkimalta Windfarm. The potential for cumulative effects is likely to be greater in the main Clare River channel downstream of the works. The UWF Grid Connection (110kV UGC) is the only project element within the Clare River catchment. Impact Quality: Negative	
Individual Evaluation of the UWF Grid Connection and of the Other Projects	
Element 1: UWF Grid Connection	
UWF Grid Connection Impact Magnitude: Approximately 12km of the 110kV UGC exists within the Clare River catchment. Effects on surface water are likely to arise mainly from trench excavation works. There are 30 no. existing culvert watercourse crossings within the Clare River catchment. Due to the transient nature of the works and the fact that the grid route is along the carriageway of a public road, the impact magnitude is expected to be Negligible to Small Adverse.	
Significance of the Impact: Imperceptible to Slight	
Rationale for Impact Evaluation: • As per Table 11-7, Negligible Adverse magnitude combined with the High Importance of the local surface water body; • The entire 110kv grid route within the Clare River catchment is along a public road; • Culvert replacement works at existing structures on Class 1 and Class 2 watercourses will only be completed between the IFI permitted season of May and September (Project Design Measure); • There is no in-stream works at the Clare River crossing itself as the 110kV UGC will be installed in the road surface over the bridge, structural works to the bridge parapets may also be required; • It's likely only between 70 – 140m 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 in the catchment);	

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- The transient nature of the works within the catchment; and,
- All effects will be brief to temporary in nature and reversible.

Other Project: Bunkimalta Windfarm

Impact Magnitude: 5 no. of the 16 No. consented Bunkimalta Windfarm turbines are located within the Clare River catchment upstream of the 110kV UGC route.

Significance of the Impact: Not Significant, as reported in the Bunkimalta WF EIS (2013)

Rationale for Impact Evaluation:

- Construction activities will be at least a minimum of 50m where possible; and,
- A Sediment Control Plan will be put in place during the construction phase to control runoff from the site.

Evaluation of Cumulative Impacts – Surface Water Quality Effects from Suspended Sediments

Cumulative Impact Magnitude: Due to the transient nature of the UWF Grid Connection works, the fact that the 110kv route is on a public road, the relatively small number of the Bunkimalta turbines within the catchment and the relatively large catchment area of the Clare River (71km^2), the magnitude of effects is likely to be Negligible to Small Adverse.

Significance of the Cumulative Impact: Imperceptible to Slight

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water body;
- The relatively small number of the Bunkimalta Windfarm turbines within the Clare River catchment;
- The relatively large surface water catchment area of the Clare River – 71km^2;
- The route of the 110kv is entirely on a public road; and,
- The transient nature of the 110kV works within the Clare River catchment.

Local Surface Water Bodies

Sensitive Aspect

Sensitive Aspect:	**Local Surface Water Bodies - Newport River (Mulkear River) Catchment**
Impact:	**Surface Water Quality Effects from Suspended Sediments**
Cumulative Impact Description	
Project Stage	Construction Stage of UWF Grid Connection

Cumulative Source: Tree felling, Earthworks and Watercourse Crossing Works

Cumulative Impact Description:
Indirect surface water quality impacts on the Newport (Mulkear) River as a result of earthworks, movement and storage of overburden, and instream works at Mountphilips, and excavations and watercourse crossing works at existing crossing structures associated with the 110kV UGC element of the Whole UWF Project and tree felling, earthworks and watercourse crossing works associated with the Bunkimalta Windfarm.

The UWF Grid Connection (Mountphilips Substation and 110kV UGC) is the only project element within the Newport (Mulkear) River catchment.

Impact Quality: Negative

Individual Evaluation of the UWF Grid Connection and of the Other Projects

Element 1: UWF Grid Connection

UWF Grid Connection Impact Magnitude:
Approximately 3.7km of the 110kV UGC exists within the Newport River catchment including the Mountphilips Substation site.

Effects on surface water are likely to arise mainly from trench excavation, watercourse crossings in-stream works and overburden storage. There are 4 no. watercourse crossings within the Newport River catchment.

Due to the transient nature of the works and the fact that the majority of the route is a long public roads the impact magnitude is expected to be Negligible Adverse.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible Adverse magnitude combined with the High Importance of the local surface water body;
- The majority of the watercourse crossings within the Newport River catchment are streams (Class 1 and Class 2 Watercourse) and therefore works at these watercourses will only be completed between the IFI permitted season of May and September (Project Design Measure);
- There is no in-stream works at the Newport (Mulkear) River crossing itself; It's likely only between 140 – 210m of the trench will be excavated in any day with only 2 – 3 watercourse crossings being completed in any one day (assumed 2 – 3 work crews); and,

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

Other Project: Bunkimalta Windfarm

Impact Magnitude: 11 no. of the 16 no. consented Bunkimalta Windfarm turbines are located within the Newport River catchment, up-stream of the UWF Grid Connection (110KV UGC route).

Significance of the Impact: Not Significant, as reported in the Bunkimalta WF EIS (2013)

Rationale for Impact Evaluation:

- Construction activities will be at least a minimum of 50m where possible; and,
- A Sediment Control Plan will be put in place during the construction phase to control runoff from the site.

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Evaluation of Cumulative Impacts – Surface Water Quality Effects from Suspended Sediments
Cumulative Impact Magnitude: Due to the transient nature of the UWF Grid Connection works, the large upstream distance to the Bunkimalta Windfarm site (~10km) and the large catchment area of the Newport River (112km^2), the magnitude of effects is likely to be Negligible
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible Adverse magnitude combined with the High Importance of the local surface water body; • The relatively small scale of the 110kV works within the Newport River catchment (2.9km); • The fact that the majority of the 110kv route is along public roads; • The large surface water catchment area of the Newport River – 112km^2; • The relatively large upstream distance of the Bunkimalta Windfarm site (~12km) from the 110kV works; • The transient nature of the 110kV UGC works within the Newport River catchment; • Sediment Control Plans will be in place at the Bunkimalta Windfarm; and, • The consented Bunkimalta grid connection is along public roads and therefore impacts on surface water quality are not expected.

11.2.4.11 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 the table below.

Table 11-22: Description and Rationale for Excluded Impacts to Local Surface Water Bodies

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				
Tree felling in Conifer Plantations Afforestation	1, 2, 3,4	SW Runoff	Surface Water Quality Impacts due to Nutrient Input	Rationale for Excluding: Neutral effect. No forestry felling is required for UWF Grid Connection. The surface water quality effects on local surface water bodies from sedimentation as a result of tree felling for UWF Related Works were assessed to be imperceptible to slight (refer to Section 11.2.4.2). This is due to the relatively small felling areas and the fact that the felling areas are distributed between several local catchments. Therefore, as a result of this minor impact from sediment, the nutrient loading is assessed to be Neutral. The Upperchurch Windfarm will have a Sediment Control Plan, and therefore, the potential for nutrient loading to local watercourses is assessed to be Neutral as a result of the consented drainage design measures. UWF Replacement Forestry: Due to the relatively small replanting area, and the fact that tree planting will be completed by hand so there will be no requirement for rill ploughing or any earthworks, it is considered that the potential for the planting works to generate sediments in runoff is negligible. As such, nutrient loading to local watercourses is assessed to be Neutral.
Decommissioning Stage Effects				
Rationale for Excluding: no potential for impacts/Neutral impacts The UWF Grid Connection will remain part of the National Grid. Therefore no hydrological impacts are expected. UWF Related Works: The cables will be pulled from the Internal Windfarm Cabling ducts at the turbines or at the substation; the ducting, Realigned Windfarm Roads and Haul Route Works will remain in-situ; therefore, no decommissioning works to lands are required. The Telecoms Relay Pole will be removed, and the compound area reinstated and returned to agricultural. Neutral effects to surface or groundwater are anticipated. The UWF Replacement Forestry will not be harvested or felled but will remain permanently in place. Therefore no hydrological impacts are expected. Upperchurch Windfarm: It is expected that the Consented UWF Substation will remain in-situ for use by ESBN, the UWF Access Roads will also remain in-situ for use by the landowner. Decommissioning works will be limited to the Consented UWF Turbines, Turbine Hardstanding areas, Meteorological Mast and associated drainage systems. All decommissioning works will take place from hard-core areas, with the majority of activity taking place on the turbine hardstands. Therefore, it is considered that decommissioning activities will have Neutral effects on surface water or groundwater.				

11.2.5 Mitigation Measures for Impacts to Local Surface Water Bodies

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 Local Surface Water Bodies as a consequence of the UWF Related Works.

11.2.6 Evaluation of Residual Impacts to Local Surface Water Bodies

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 Local Surface Water Bodies above (Section 11.2.4). i.e. **no significant adverse impacts**.

11.2.7 Application of Best Practice and the EMP for Local Surface Water Bodies

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 **Local Surface Water Bodies,** 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 along the Whole Windfarm Project areas
RW-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole Windfarm Project areas

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

11.2.7.1 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 UWF Related Works Environmental Management Plan, and accompanies this planning application as Volume D.

11.2.8 Summary of Impacts to Local Surface Water Bodies

A summary of the Impacts to Local Surface Water Bodies is presented in Table 11-23.

The greyed out boxes in the below 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.

Table 11-23: Summary of the impacts to Local Surface Water Bodies

Impact to Local Surface Water Bodies:	Morphological Impacts due to instream works	Surface water quality impacts					Water quality impacts from		
		due to tree felling	due to earthworks	from dewatering of excavations	from watercourse crossing works	Runoff from Permanent surfaces	fuels, oils and chemicals	from cement-based compounds	Increased Flood Risk
Evaluation Impact Table	*Section 11.2.4.1*	*Section 11.2.4.2*	*Section 11.2.4.3*	*Section 11.2.4.4*	*Section 11.2.4.5*	*Section 11.2.4.9*	*Section 11.2.4.6*	*Section 11.2.4.7*	*Section 11.2.4.8*
Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction	Operational	Construction	Construction	Operational
UWF Related Works	**Slight to Moderate**	**Imperceptible**	**Slight to Moderate**	**Imperceptible**	**Imperceptible to Slight**	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**
UWF Related Works Cumulative	Imperceptible	Imperceptible to Slight	Slight to Moderate	Imperceptible	Imperceptible to Slight	Imperceptible	Imperceptible	Imperceptible	Imperceptible
Element 1: UWF Grid Connection	Imperceptible	No potential for impact	Imperceptible to Slight	Imperceptible	Imperceptible to Slight	Imperceptible	Imperceptible	Imperceptible	Imperceptible
Element 3: UWF Replac. For.	No Potential for Impact	No Potential for Impact	Imperceptible	No Potential for Impact	No Potential for Impact	No Potential for Impact	Imperceptible	No Potential for Impact	No Potential for Impact
Element 4: Upperchurch WF	Imperceptible	Not Significant	Not Significant	Not Significant	Imperceptible	Not Significant	Not Significant	Not Significant	Not Significant
Element 5: UWF Other Act.		No Potential for Impact - Evaluated as Excluded, see Section 11.2.2.2.1							
Other Cumulative Impacts									
Whole UWF Project	Slight	Imperceptible to Slight	Slight to Moderate	Imperceptible	Imperceptible to Slight	Imperceptible	Imperceptible	Imperceptible to Slight	Imperceptible
Whole UWF Project *cumulatively with* Other Projects or Activities: Bunkimalta	No Potential for Cumulative Impact	Imperceptable to Slight– *See Section 11.2.4.10* Please Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project (in particular UWF Grid Connection). There is no potential for cumulative effects with the UWF Related Works).					No Potential for Cumulative Impact - Evaluated as Excluded, see Section 11.2.2.2.1		

Topic	Water

REFERENCE DOCUMENTS

Sensitive Aspect	Local Surface Water Bodies

Local Groundwater Bodies

Sensitive Aspect

Water

Topic

11.3 Sensitive Aspect No.2: Local Groundwater Bodies

This Section provides a description and evaluation of the Sensitive Aspect - Local Groundwater Bodies.

11.3.1 BASELINE CHARACTERISTICS of Local Groundwater Bodies

11.3.1.1 STUDY AREA for Local Groundwater Bodies

The study area for Local Groundwater Bodies in relation to the UWF Related Works is described in Table 11-24 and illustrated on Figure RW 11.3: Local Groundwater Bodies within UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 11-24: UWF Related Works Study Area for Local Groundwater Bodies

Study Area for Local Groundwater Bodies	Justification for the Study Area Extents
Local GWBs catchment divides as defined by GSI/WFD	Defined by bedrock lithology, local topography and groundwater flow.

11.3.1.2 Baseline Context & Character of Local Groundwater Bodies in the UWF Related Works Study Area

The UWF Related Works exist within two separate Groundwater Bodies (GWBs) which are called the Slieve Phelim GWB and the Templemore A GWB, which are made up of various local bedrock aquifer types.

The majority of the UWF Related Works are located in the Templemore A GWB with the western extents of the construction works areas extending into the Slieve Phelim GWB.

The Slieve Phelim GWB extends from Newport as far east as Milestone and contains the Mauherslieve Mountains, Slieve Felim Mountains and extends north as far as the Silvermine Mountains. The total area of the GWB is 520km^2. The regional groundwater flow direction at the location of the construction works areas within the Slieve Phelim GWB is to the south.

The Templemore A GWB extends from north of Templemore south towards Annacarthy and has a total area of 300km^2. The GWB contains the Silvermine Mountains, Kilduff Mountain and Devilsbit Mountain. The land elevation drops off to the east of these mountains towards the River Suir valley. The regional groundwater flow direction at the location of the construction works areas within the Templemore A GWB is to the east/ southeast.

The Groundwater Bodies are made up of various local bedrock aquifer types. In the area of the Related Works, both these GWBs comprise Poor Bedrock Aquifers.

In general, the groundwater flow regime of both bedrock types is typically poorly productive. These bedrock aquifers generally have no inter-granular permeability. Groundwater flows within fractures and faults are more likely to occur within the Locally Important Aquifers rather the Poor Aquifers.

The permeability of individual fractures and the degree of interconnection will be generally low, with fracturing confined to local zones. Permeability is highest in the upper few metres but generally decreases rapidly with depth. In general, groundwater flow is concentrated in the upper 15m of the aquifer, although deeper inflows from along fault zones or connected fractures can be encountered. In these rocks, groundwater flowpaths are expected to be relatively short, typically from 30-300m, with groundwater discharging to small springs, or to the streams that traverse the aquifer. Flow directions are expected to approximately follow the local topography (GSI, 2004).

Baseflow contribution to streams tends to be low, particularly in summer as the groundwater regime cannot sustain summer baseflows due to low storativity with the aquifer. In winter, low permeabilities will lead to a high water table and potential water logging of soils which is consistent with the mapped soil type on the

lower slopes of the site (i.e. poorly drained mineral). Local groundwater flow directions will mimic topography whereby flowpaths will be from topographic high points to lower elevated discharge areas at local streams.

Due to the nature of the local groundwater flow regime in the area (*i.e.* short groundwater flowpaths discharging locally to streams), there is expected to be a strong surface water – groundwater interaction at the works areas. This means that any significant impact on groundwater quality locally is likely to result in indirect impacts on local surface water quality.

20 no. trial pits were undertaken in the area of the Upperchurch Windfarm, which are relevant to the UWF Related Works areas. Trial pits were up to 3m in depth (typically 2m), and no groundwater inflows were recorded in any of the trial pits.

Groundwater Quality: There is no existing data for groundwater quality in the area of the UWF Grid Connection, UWF Related Works, Upperchurch Windfarm or UWF Replacement Forestry. However, both the Slieve Phelim GWB and the Templemore A GWB are assigned 'Good Status'[3] (www.catchments.ie). This applies to both quantitative status and chemical status. The objective for both GWBs is to protect the current 'Good Status' condition.

11.3.1.3 Importance of Local Groundwater Bodies

There is no existing data for groundwater quality in the area. However, both the Slieve Phelim GWB and the Templemore A GWB are assigned 'Good Status' (www.catchments.ie). This applies to both quantitative status and chemical status. The objective, under the Water Framework Directive is to protect the current 'Good Status' condition. Also, groundwater is used locally as a drinking water supply and therefore good groundwater quality is important from a human health perspective.

11.3.1.4 Sensitivity of Local Groundwater Bodies

The primary sensitivities in respect of the subject development will be groundwater quality, which can be affected by oil/chemical spillages. Due to the nature of the local groundwater flow regime in the area (*i.e.* short groundwater flowpaths discharging locally to streams), there is expected to be a strong surface water – groundwater interaction in proximity to works areas. This means that any significant impact on groundwater quality locally is likely to result in indirect impacts on local surface water quality.

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

Both the Slieve Phelim GWB and the Templemore A GWBs have been assigned 'Good Status' and the reported WFD risk result in respect of groundwater quality, and quantity is "Not At Risk". Therefore, no trends (*i.e.* reduction in groundwater quality or groundwater levels) have been reported.

11.3.1.6 Receiving Environment (the Baseline + Trends)

It is assumed that the groundwater body status within the study area will be at least Good during the construction stage. This is based on the assumption that groundwater bodies will have to achieve at least Good Status.

[3] 'Status' means the condition of the water in the waterbody. It is defined by its chemical status and its ecological status, whichever is worse. Waters are ranked in one of 5 classes: High, Good, Moderate, Poor and Bad (WFD, 2010).

11.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.3.2.1 Cumulative Evaluation Study Areas

11.3.2.1.1 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 Local Groundwater Bodies	Justification for the Study Area Extents
Local GWBs catchment divides as defined by GSI/WFD within 300m of construction works areas	Within the underlying aquifer, groundwater flowpaths are expected to be relatively short, typically from 30-300m before groundwater discharges locally into streams. Therefore, for cumulative effects to occur on groundwater, Other Elements or Other Projects or Activities will have to be within 300m of UWF Related Works.

The study is illustrated on Figure CE 11.3 Local Groundwater Bodies within the UWF Related Works Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

11.3.2.1.2 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 11.3.2.2.1 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 11-25 and illustrated on Figure WP 11.3: Local Groundwater Bodies within the Whole Project Cumulative Evaluation Study Area.

Table 11-25: Whole Project Cumulative Evaluation Study Area for Local Groundwater Bodies

Cumulative Evaluation of all of the Elements of the Whole UWF Project		
Cumulative Project	**Cumulative Study Area Boundary**	**Justification for Study Area Extent**
Element 1: UWF Grid Connection	Local GWBs catchment divides as defined by GSI/WFD within 300m of construction works areas	Within the underlying aquifer, groundwater flowpaths are expected to be relatively short, typically from 30-300m before groundwater discharges locally into streams. Therefore, for cumulative effects to occur on groundwater, other elements will have to be within Other Elements will have to be within 300m of another Element.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

11.3.2.2 Scoping for Other Projects or Activities and Scoping for Potential for Impacts

The evaluation of cumulative impacts to Local Groundwater Bodies 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 Local Groundwater Bodies 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 A2.3.2.11).

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 Local Groundwater Bodies.

11.3.2.2.1 Potential for Impacts to Local Groundwater Bodies

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 Local Groundwater Bodies. The results of this evaluation are included in Table 11-26.

The location of, and study area boundary associated with the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 11.3. The baseline character of the areas around these Elements is described in Section 11.3.2.3.

Table 11-26: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Elements 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 likely impacts/no potential for impacts due to: The UWF Replacement Forestry site is located entirely within the Templemore A GWB. Within the Templemore A GWB, the area within and around the UWF Replacement Forestry site is underlain by Poor Bedrock Aquifers. • No likely measurable impact to groundwater quality, due to the small-scale nature of the works and the planting method to be employed - the new trees will be planted by hand using spades, • No likely measurable impact to groundwater quality, due to the small-scale nature of the works as plant and equipment used for the UWF Replacement Forestry works will be limited to 4 x 4 jeeps, and there will be no refueling or storage of fuels will be undertaken on site, • No potential for impacts to groundwater quality as cement-based compounds will not be used at the UWF Replacement Forestry site, • No potential for impacts to groundwater levels (quantity) as there will be no requirement for excavations or dewatering of excavations. • The UWF Replacement Forestry will not be harvested or felled but will remain permanently in place. Therefore, no hydrological impacts are expected.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No likely impacts/Neutral effects due to: • The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no hydrological / water quality effects are likely.

	• Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore no groundwater impacts are expected. • Monitoring Activities do not require any major construction activities. Therefore, groundwater impacts are expected. Once off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality. • During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore there is no potential for effects to groundwater.

11.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.3.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

The UWF Grid Connection exists within two separate Groundwater Bodies (GWBs) which are called the Slieve Phelim GWB and the Templemore A GWB, which are made up of various local bedrock aquifer types.

The Mountphilips 110kV UGC and the majority of the 110kV UGC route exists (c 27.4km of the total 28.9km) within the Slieve Phelim Groundwater Body (GWB) with the far eastern section of the 110kV UGC route extending into the Templemore A GWB.

The location of the subject development in relation to Local Groundwater Bodies is illustrated on Figure WP 11.3: Location of Local Groundwater Bodies within the Whole Project Cumulative Evaluation Study Area.

Within the Slieve Phelim GWB, the construction works areas are underlain by both Poor Bedrock Aquifers and Locally Important Aquifers with the former being more dominant. Within the Templemore A GWB, the construction works areas are completely underlain by Poor Bedrock Aquifers.

Due to the shallow nature of the trench and the fact that the majority of the grid cables will be placed within the carriageway of public roads, interaction with the local groundwater table is not anticipated.

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in both the Slieve Phelim GWB and the Templemore A GWB. In total 27.7hectares of construction works areas for UWF Grid Connection are located within the Slieve Phelim GWB, and 2.3 hectares of construction works areas for UWF Grid Connection are located within the Slieve Phelim GWB in the UWF Related Works Cumulative Evaluation Study Area, respectively.

11.3.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 11.3.2.2.1

11.3.2.3.3 Element 4: Upperchurch Windfarm

The Upperchurch Windfarm exists within two separate Groundwater Bodies (GWBs) which are called the Slieve Phelim GWB and the Templemore A GWB.

The majority of the Upperchurch Windfarm footprint is located in the Templemore A GWB with the western extents of the construction works areas extending into the Slieve Phelim GWB.

20 no. trial pits were undertaken in the area of the Upperchurch Windfarm, which are relevant to the UWF Related Works areas. Trial pits were up to 3m in depth (typically 2m), and no groundwater inflows were recorded in any of the trial pits.

Consideration of the Passage of Time: It is considered that there have been no material changes in the baseline environment and the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

11.3.2.3.4 Element 5: UWF Other Activities

Not applicable – UWF Other Activities evaluated as excluded. See Section 11.3.2.2.1

11.3.2.3.5 Other Projects or Activities:

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.3.2.1.

11.3.3 PROJECT DESIGN MEASURES for Local Groundwater Bodies

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 11-27 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect Local Groundwater Bodies.

Table 11-27: UWF Related Works Project Design Measures relevant to Local Groundwater Bodies

PD ID	Project Design Environmental Protection Measure (PD)
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
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

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.

11.3.4 EVALUATION OF IMPACTS to Local Groundwater Bodies

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) - Local Groundwater Bodies.

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

Table 11-28: 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)*
Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals (construction stage)	*Operational Stage Effects*
Groundwater quality impacts from cement-based compounds (construction stage)	*Decommissioning Stage Effects*
Groundwater level (quantity) impacts from dewatering of excavations (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 11.3.4.1 to 11.3.4.3.**

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 11.3.4.4.

11.3.4.1 Impact Evaluation Table: Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Fuels, oils and hydrocarbons
Cumulative Impact Source: Fuels, oils and hydrocarbons
Impact Pathway: Soil / subsoil pore space and groundwater flowpaths

Impact Description: The plant and equipment that will be used during the construction phase will be run on fuels and oils. This creates the potential for spillage and leakage of hydrocarbons from plant during refuelling or storage of oils and fuels which can leach into groundwater underlying the works.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Plant and equipment will be used at all the UWF Related Works areas and therefore groundwater under the construction works areas is a potential receptor. However, any effects are only likely to be minor and localised.

Given the transient and distributed nature of the works within the groundwater body, the localised groundwater flow regime (short flowpaths to local streams) and the fact that only small volumes will be present on-site at one time, the magnitude of impact is considered to be **Negligible**. The **Project Design Measures**, which are listed below, are also considered in the assessment of magnitude.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Low Importance** of the local aquifer (Poor Aquifer);
- All fuels required for construction activities will be stored in a designated location, away from main traffic activity, within the windfarm Temporary Compounds. All fuel will be stored in bunded, locked storage containers (**Project Design Measure**);
- All chemical wastes will be stored in secure, bunded and covered storage containers, in a designated secure part of the Temporary Compounds, and will be removed from site and transported to an approved licensed facilities (**Project Design Measure**);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may occur along the works area; and,
- Any accidental minor (low volume) spills on the ground surface will likely be absorbed by the underlying soils/subsoils and not be leached into the underlying groundwater.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effects of UWF Related works with UWF Grid Connection to local groundwater to occur along the public road in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons and along the Consented UWF Roads where both UWF Grid Connection works and/or Upperchurch Windfarm works occur within 300m of UWF Related Works.

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

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Sensitive Aspect: Local Groundwater Bodies

Given the transient and distributed nature of the works within the groundwater body, the localised groundwater flow regime (short flowpaths to local streams) and the fact that only small volumes will be present on-site at one time, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Low Importance** of the local aquifer (Poor Aquifer);
- All fuels required for construction activities will be stored in a designated location, away from main traffic activity, within the windfarm Temporary Compound. All fuel will be stored in bunded, locked storage containers (**Project Design Measure**);
- All chemical wastes will be stored in secure, bunded and covered storage containers, in a designated secure part of the Temporary Compound, and will be removed from site and transported to an approved licensed facilities (**Project Design Measure**);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may along the works area; and,
- Any accidental minor (low volume) spills on the ground surface will likely be absorbed by the underlying soils/subsoils and not be leached into the underlying groundwater.

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

Element 1: UWF Grid Connection

Impact Magnitude:

Plant and equipment will be used at all UWF Grid Connection construction works areas and therefore groundwater under the construction works areas is a potential receptor. However, any effects are only likely to be minor and localised.

Given the transient and distributed nature of the works within the groundwater body, the localised groundwater flow regime (short flowpaths to local streams) and the fact that only small volumes of fuels/oils will be present on-site at one time, the magnitude of impact is considered to be Negligible. The Project Design Measures, which are listed below, are also considered in the assessment of magnitude.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Low to Medium Importance of the local aquifer (Poor – Locally Important Aquifer);
- All fuels required for construction activities will be stored in a designated location, away from main traffic activity, within the Temporary Compound at Mountphilips. All fuel will be stored in bunded, locked storage containers (Project Design Measure);
- Overnight parking of plant and machinery will only be permitted at designated sites where there is a hardcore surface in place, and this reduces the risk to groundwater posed by leaks (Project Design Measure);
- All chemical wastes will be stored in secure, bunded and covered storage containers, in a designated secure part of the Temporary Compounds, and will be removed from site and transported to an approved licensed facilities (Project Design Measure);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may occur along the UWF Grid Connection construction works area;
- Any accidental minor (low volume) spills on the ground surface will likely be absorbed by the underlying soils/subsoils and not be leached into the underlying groundwater;
- The majority of the 110kv route is along surface public roads.

Element 3: UWF Replacement Forestry– *N/A, evaluated as excluded, see Section 11.3.2.2.1*

Element 4: Upperchurch Windfarm
Impact Magnitude: Based on Chapter 15 (Hydrology) of the 2013, the main risk to groundwater quality at the site will be from spills and leaks of hydrocarbons. The overall effects were assessed to be Not Significant.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • Implementation of a Fuel Management Plan which will require best practices to be carried out in respect of refuelling, handing and storage of fuels; and, • Procedures and contingency plans will be set up to deal with accidental spills and leaks.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.3.2.2.1*
Evaluation of Other Cumulative Impacts – Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals
Whole UWF Project Effect
Cumulative Impact Magnitude: Plant and equipment will be used at all the Whole UWF Project works areas, and therefore groundwater along the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm works areas is a potential receptor. However, any effects are only likely to be minor and localised. Given the transient and distributed nature of the works within two separate groundwater bodies, the localised groundwater flow regime (short flowpaths to local streams) and the fact that only small volumes will be present on-site at one time, the in-combination magnitude of impact is considered to be **Negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Low to Medium Importance** of the local aquifers; • The construction work areas associated with the UWF Grid Connection (91% within Slieve Phelim GWB) and the UWF Related Works and Upperchurch Windfarm (84% within Templemore A) are largely located in separate groundwater bodies, and therefore there is no potential for significant in-combination effects; and, • Groundwater flowpaths in the area of the Upperchurch Windfarm and UWF Related Works are expected to be localised (i.e. any recharge on the local hills will discharge into local streams) and therefore increased concentrations of hydrocarbons in groundwater locally as a result of isolated spills/leaks within the windfarm is not expected.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Local Groundwater Bodies with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.3.2.1).

Local Groundwater Bodies
Sensitive Aspect

11.3.4.2 Impact Evaluation Table: Groundwater quality impacts from cement-based compounds

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Cement based compounds Cumulative Impact Source: Cement based compounds Impact Pathway: Soil / subsoil pore space and groundwater flowpaths Impact Description: Concrete and other cement-based products are highly alkaline and corrosive and can have negative impacts on local groundwater quality. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Groundwater quality impacts from cement-based compounds	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: The use of cement-based compounds will be limited to the Telecom Relay Pole foundation (c.4m^3) and 9 No. of public road crossings (c.3-5m each). Therefore no impacts on surface water or groundwater quality are anticipated.	
Significance of the Impact: No Impact	
Rationale for Impact Evaluation: • The volumes to be used on-site are negligible, and therefore no impacts on groundwater quality are expected.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: No cumulative effects between UWF Related Works and Upperchurch Windfarm as the UWF Related Works Telecom Relay Pole and public road crossings are greater than 300m from the Upperchurch Windfarm turbines and substation. There is potential for cumulative effects to groundwater between the UWF Related Works and UWF Grid Connection at the internal windfarm cable road crossing R6 (20m³) and the 110kV UGC (210m³ of concrete within 300m of the R6 road crossing) along that section of public road. No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works. Given the volumes to be used on-site are negligible, the magnitude of impact is considered to be negligible.	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation: The volumes to be used on-site are negligible, and therefore no impacts on groundwater quality are expected.	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
Impact Magnitude: The main use of cement-based compounds will be in the 110kV UGC cable trench and during the construction of foundations at the Mountphilips Substation / End Masts. Cement leachate has the potential to percolate into the underlying aquifer and contaminate groundwater locally.	

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Given the shallow nature of the works, the transient and distributed nature of the works within the groundwater body, the localised groundwater flow regime (short flowpaths to local streams) and the fact that relatively only small volumes of cement will be placed at one time, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Low to Medium Importance of the local aquifers (Poor – Locally Important Aquifer);
- Due to the narrow, linear nature of the 110kV UGC trench and the small volumes of cement required per meter (~0.4m^3), the total volume of semi-dry lean-mix cement placed within local groundwater catchments along the route will be small, and the potential for groundwater quality effects will be negligible;
- A relatively small volume of wet cement will also be required at the Mountphilips Substation foundations (both within the Substation Compound and at the foundations for the 2 No. End Masts);
- It is not expected that cement will only come in direct contact with groundwater; and,
- Only a brief to temporary (and reversible) increase in the pH and alkalinity of the local groundwater is likely to occur. The effects will only persist until the cement mix has hardened and the high alkalinity leachate flushed out / diluted by rainfall or groundwater flow. The effects will be assimilated by the local groundwater flow.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.3.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
The primary use of cement at the Upperchurch Windfarm site will be at the 22 no. turbine locations and the substation site for foundation construction purposes.
Given the spread-out nature of the windfarm over a relatively large area, the localised groundwater flow regime (short flowpaths to local streams) and the fact that the works will be completed in stages, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Low Importance of the local Aquifer (Poor Aquifer);
- The turbine bases and substation are distributed out over a large geographical area (1,154ha) comprising several local groundwater catchments (as define by topography), and therefore the total volume of cement within any one groundwater catchment will be negligible; and,
- At worst a brief to temporary (and reversible) increase in the pH and alkalinity of the groundwater down-gradient of the works area is likely to occur. The effects will only persist until the cement mix has hardened and the high alkalinity leachate flushed out / diluted rainfall or by groundwater flow.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.3.2.2.1*

Evaluation of Other Cumulative Impacts – Groundwater quality impacts from cement-based compounds

Whole UWF Project Effect

Cumulative Impact Magnitude:
Localised and temporary change in groundwater quality at the footprint of the development areas.
Given the transient and distributed nature of the works within two separate groundwater bodies, the localised groundwater flow regime (short flowpaths to local streams) and the fact that only relatively small volumes will be present on-site at one time, the in-combination magnitude of impact is considered to be **Negligible**.

Local Groundwater Bodies

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Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Low to Medium Importance** of the local aquifers; • The works areas associated with the 110kV UGC (Slieve Phelim GWB) and the Upperchurch Windfarm (Templemore A GWB) are largely located in separate groundwater bodies, and therefore there is no potential for significant in-combination effects

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Local Groundwater Bodies with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.3.2.1).

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Water

11.3.4.3 Impact Evaluation Table: Groundwater level (quantity) impacts from dewatering of excavations

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Excavation Dewatering Cumulative Impact Source: Excavation Dewatering Impact Pathway: Groundwater flowpaths Impact Description: Impacts on local groundwater levels as a result of pumping of excavations such as the cable trench. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Groundwater level (quantity) impacts from dewatering of excavations	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: Due to the elevated position of the windfarm site, the shallow nature of the excavation works and the fact that the groundwater table was not intercepted by any of the windfarm trial holes, no effects on the local groundwater levels are expected.	
Significance of the Impact: No. Impact	
Rationale for Impact Evaluation: • Due to the shallow nature of the works and the elevated nature of the works area, no impacts on groundwater levels are expected.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: No excavation dewatering is expected for Internal Windfarm Cabling or any other UWF Related Works. Therefore, cumulative dewatering effects with Upperchurch Windfarm and/or UWF Grid Connection is unlikely to occur.	
Significance of the Impact: No Cumulative Impact	
Rationale for Impact Evaluation: • Due to the shallow nature of the works and the elevated nature of the works area, UWF Related Works is not likely to cause effects to groundwater level, either alone or cumulatively with Upperchurch Windfarm and/or UWF Grid Connection.	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
Impact Magnitude: Due to the fact that the majority of the 110kv grid connection is along the carriageway of public roads no dewatering is likely. No effects on groundwater levels are likely.	
Significance of the Impact: No Impact	
Rationale for Impact Evaluation: As per Table 11-7, Negligible magnitude combined with the Low to Medium Importance of the local aquifer (Poor to Locally Important) due to the shallow nature of the cable trench / joint bays, no effects on local groundwater levels and flows are likely; and,	

• Location of the 110kV UGC on the public road network.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.3.2.2.1*
Element 4: Upperchurch Windfarm
Impact Magnitude: Impacts relating to groundwater levels and flows was not undertaken in the 2013 EIS and therefore are evaluated below for the purpose of the cumulative impact assessment. Based on Chapter 15 (Hydrology) of the 2013, limited and discontinuous seepage is expected from the sides of the turbine bases in sloping ground, and this is more likely to occur during wetter winter periods. This suggests that seepages will largely be as result of surface water runoff or minor groundwater seepages along the subsoil/bedrock interface. However, no seepages were reported during the trial pit investigation which was completed in October 2011. Therefore, the magnitude of impact is considered to be Negligible.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the Low Importance of the aquifer (Poor aquifer); • Due to the elevated nature of the Upperchurch Windfarm site, significant interaction with the local groundwater table is not expected; and, • Groundwater flows (if present) will be limited to groundwater seepage at the subsoil / bedrock interface and therefore significant impacts on local groundwater levels are not expected.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.3.2.2.1*
Evaluation of Other Cumulative Impacts – Groundwater level impacts from dewatering of excavations
Whole UWF Project Effect
Cumulative Impact Magnitude: Excavations are associated with UWF Grid Connection, UWF Related Works and Upperchurch Windfarm, with works spread over two groundwater bodies. No dewatering is expected for UWF Related Works and UWF Grid Connection, minimal dewatering is likely to be required for Upperchurch Windfarm.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: The impact will be as for the Upperchurch Windfarm.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Local Groundwater Bodies with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.3.2.1).

11.3.4.4 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 the table below.

Table 11-29: Description and Rationale for Excluded Impacts to Local Groundwater Bodies

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Operational Stage Effects				
There will be no excavation works required during the operational phase that would have an effect on groundwater levels. There are no discharges to ground (i.e. wastewater) and the volumes of oils and fuels present on-site at any one time (i.e. for maintenance purposes) will be negligible				
Decommissioning Stage Effects				
Rationale for Excluding: no potential for impacts/Neutral impacts UWF Grid Connection will remain part of the National Grid. Therefore no hydrological impacts are expected. UWF Related Works: The cables will be pulled from the Internal Windfarm Cabling ducts at the turbines or at the substation; the ducting, Realigned Windfarm Roads and Haul Route Works will remain in-situ; therefore, no decommissioning works to lands are required. The Telecoms Relay Pole will be removed, and the compound area reinstated and returned to agricultural. Neutral effects to groundwater are anticipated. Upperchurch Windfarm: It is likely that the Consented UWF Substation will remain in-situ for use by ESBN and that the Consented UWF Roads will also remain in-situ for use by the landowner. Decommissioning works will be limited to the Consented UWF Turbines, Turbine Hardstanding areas, Meteorological Mast and associated drainage systems. All decommissioning works will take place from hard-core areas, with the majority of activity taking place on the turbine hardstands. Therefore, it is considered that decommissioning activities will have Neutral effects on groundwater.				

11.3.5 Mitigation Measures for Impacts to Local Groundwater Bodies

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 Local Groundwater Bodies as a consequence of the UWF Related Works.

11.3.6 Evaluation of Residual Impacts to Local Groundwater Bodies

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 Local Groundwater Bodies above (Section 11.3.4) – i.e. **no significant adverse impacts**.

11.3.7 Application of Best Practice and the EMP for Local Groundwater Bodies

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 **Local Groundwater Bodies,** by the authors of this topic chapter, using industry best practice:

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

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

11.3.7.1 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 UWF Related Works Environmental Management Plan, which accompanies this planning application as Volume D.

11.3.8 Summary of Impacts to Local Groundwater Bodies

A summary of the Impacts to Local Groundwater Bodies is presented in Table 11-30.

Table 11-30: Summary of Impacts to Local Groundwater Bodies

Impact to Local Groundwater Bodies:	**Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals**	**Groundwater quality impacts from cement-based compounds**	**Groundwater level (quantity) impacts from dewatering of excavations**
Evaluation Impact Table	*Section 11.3.4.1*	*Section 11.3.4.2*	*Section 11.3.4.3*
Project Life-Cycle Stage	Construction	Construction	Construction
UWF Related Works *Direct/Indirect impact*	**Imperceptible**	**No Impact**	**No Impact**
UWF Related Works *Cumulative Impact*	**Imperceptible**	**Imperceptible**	**No Cumulative Impact**
Element 1: UWF Grid Connection	Imperceptible	Imperceptible	No impact
Element 3: UWF Replacement Forestry	No potential for impact	No potential for impact	No potential for impact
Element 4: Upperchurch Windfarm	Not Significant	Imperceptible	Imperceptible
Element 5: UWF Other Activities	Neutral Impacts/No Potential for Impact Evaluated as Excluded – see Section 11.3.2.2.1		
Other Cumulative Impacts:			
Whole UWF Project Effect	**Imperceptible**	**Imperceptible**	**Imperceptible**

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to 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 were evaluated as having potential to cause cumulative effects to Local Water Dependant Habitats with any Element of the Whole UWF Project (see Section 11.8.3.1).

Local Groundwater Bodies

Sensitive Aspect

Water

Topic

11.4 Sensitive Aspect No.3: Local Wells & Springs

This Section provides a description and evaluation of the Sensitive Aspect - Local Wells & Springs.

Wells and springs, fed by groundwater, are used locally as a potable supply for human consumption or for farm animals.

11.4.1 BASELINE CHARACTERISTICS of Local Wells & Springs

11.4.1.1 STUDY AREA for Local Wells & Springs

The study area for Local Wells & Springs in relation to the UWF Related Works is described in Table 11-31 and illustrated on Figure RW 11.4: Local Wells & Springs within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 11-31: UWF Related Works Study Area for Local Wells & Springs

Study Area for Local Wells & Springs	Justification for the Study Area Extents
50m corridor, either side of construction works area	Due to the shallow depth and temporary nature of the excavations associated with the construction works, the potential for impacts to local wells/springs is limited to physical contact with the well head/source or localised changes to surface water runoff/groundwater flow or localised contamination of the source by fuel/oil spills/cement-based compounds.

11.4.1.2 Baseline Context and Character of Local Wells & Springs in the in the UWF Related Works Study Area

Based on the GSI well database, there are no source protection zones (relating to group schemes or public supplies) mapped in the study areas. A search of the GSI database for wells (50m mapped accuracy) within 100m of the UWF Related Works identified only 4 no. wells - mapped well 1715NEW064 (GSI Ref) is located at Knockcurraghbola Commons townland in the area of the UWF Related Works (Internal Windfarm Cables route section SW81 and Haul Route section HW12), mapped well 1715NEW063 (GSI Ref) is located at Knockcurraghbola Commons townland in the area of the UWF Related Works (Haul Route section HW6), mapped well 1715NEW065 (GSI Ref) is located at Foilnaman townland in the area of the UWF Related Works (Internal Windfarm Cables route section SW63) and mapped well 1715NEW108 is located at Knockcurraghbola Commons townland in the area of the UWF Related Works (Internal Windfarm Cables route section SW51). These 4 no. bored wells are located up-gradient of the construction works areas and therefore cannot be impacted, and consequently, they **are scoped out** from further assessment in this chapter.

As the GSI well database is not exhaustive in terms of the locations of all wells in the area (as the database relies on the submission of data by drillers and the public etc.) consultation was undertaken with landowners whose dwelling house/property is within UWF Related Works Study Area boundary, regarding the nature of their water supply and its location. There are 5 wells within 100m of the UWF Related Works, however, as outlined in Table 11-32, **3 No.** of these wells were identified within 50m of the UWF Related Works and all are located upslope of the works area and therefore **are scoped out for further assessment** as no impacts are anticipated.

The location of the UWF Related Works in relation to Local Wells & Springs is identified on Figure RW 11.4: Local Wells & Springs within the UWF Related Works Study Area

Table 11-32: Dwelling Houses within 100m of the UWF Related Works

Supply Source ID	Location of Source in Relation to the UWF Related Works Study Area
RW Well 1	Upslope of the Internal Windfarm Cabling (S57)
RW Well 2	Upslope of the Internal Windfarm Cabling (S53)
RW Well 3	Upslope of the Internal Windfarm Cabling (S66)

11.4.1.3 Importance of Local Wells & Springs

The sources identified during landowner consultations are all reported to be bored wells, and they are used as domestic supplies.

11.4.1.4 Sensitivity of Local Wells & Springs

Due to the shallow nature of the cable trenches and foundation works, significant impacts on groundwater levels and groundwater flows are not expected to occur. Wells are sensitive to groundwater quality impacts from potential spills and leaks.

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

No trends are known in respect of water quality or quantity of the sources identified. The raw water quality of the sources is expected to reflect the groundwater quality in the local aquifer.

11.4.1.6 Receiving Environment (the Baseline + Trends)

It is assumed that the existing sources identified will be the receiving environment during the time of the development works.

11.4.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.4.2.1 Cumulative Evaluation Study Areas

11.4.2.1.1 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 Local Wells & Springs	Justification for the Study Area Extents
100m corridor, either side of construction works area	The study area for cumulative effects with UWF Related Works is doubled to include any Other Elements or Other Projects or Activities which could contribute to cumulative effects with UWF Related Works.

The study is illustrated on Figure CE 11.4 Local Wells & Springs within the UWF Related Works Cumulative Evaluation Study Area.

11.4.2.1.2 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 11.4.2.2.1 below.

The 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 11-33 and illustrated on Figure WP 11.4 Local Wells & Springs within the Whole Project Cumulative Evaluation Study Area.

Table 11-33: Whole Project Cumulative Evaluation Study Area for Local Wells & Springs

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	100m corridor, either side of construction works area from construction work area boundaries for Other Elements. Within 300m of the construction works areas associated with the various elements of the Whole UWF Project to identify Other Projects or Activities which could contribute to cumulative effects.	A conservative 100m study area is used to identify houses and buildings which may have local private well/spring water supplies Within the underlying aquifer, groundwater flowpaths are expected to be relatively short, typically from 30-300m before groundwater discharges locally into streams. Therefore, for cumulative effects to occur on groundwater, other Projects or Activities will have to be within 300m
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

11.4.2.2 Scoping for Other Projects or Activities and Scoping for Potential for Impacts

The evaluation of cumulative impacts to Local Wells & Springs 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 Local Wells & Springs 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 A2.3.2.11).

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 Local Wells & Springs.

11.4.2.2.1 Potential for Impacts to Local Wells & Springs

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 Local Wells & Springs. The results of this evaluation are included in Table 11-34. The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 11.4. The baseline character of the areas around these Elements is described in Section 11.4.2.3.

Table 11-34: 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 the absence of any wells within 50m of the afforestation lands.
Element 4: Upperchurch Windfarm (UWF)	Evaluated as excluded: No potential for effects due to the absence of any wells within 50m of construction works. The closest well is GSI mapped well 1715NEW108, which is located up-gradient of Site Entrance No.6, in Knockcurraghbola Commons townland.
Element 5: UWF Other Activities	Evaluated as excluded: No likely effect/Neutral effect/No potential for effects due to: • The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no water quantity or quality effects to Local Wells & Springs are likely. • Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore, no water quantity or quality effects to Local Wells & Springs are expected. • Monitoring Activities do not require any major construction activities. Therefore, no surface water or groundwater impacts are expected. Once off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality. • During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore there is no potential for impacts to Local Wells & Springs.

11.4.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.4.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

Based on the GSI well database, there are no source protection zones (relating to group schemes or public supplies) mapped in the study areas. A search of the GSI database for wells (50m mapped accuracy) found that there are 4 no GSI wells within 100m of UWF Grid Connection works (GSI Ref: 1715SEW030, 1715SEW031, 1715SEW033, 1715NEW064). However, the GSI well database is not exhaustive in terms of the locations of all wells in the area as the database relies on the submission of data by drillers and the public etc. Consultation was untaken with house owners along the 110kV UGC route. Door to door calls confirm that the vast majority of residents and business are supplied by public mains. There are public water mains along the entire length of the 110kV UGC. Outside of the Newport town and Rearcross village there are circa.230 residents within 100m of the UWF Grid Connection construction works area. Of these residents only 5 No. use private well within 100m and are downslope of the works. The location of the UWF Grid Connection in relation to local residences and business, and the status of known/unknown use of Local Wells & Springs is identified on Figure WP 11.4.

Table 11-35: Potential Local Wells & Springs within 100m downslope of the UWF Grid Connection

No. Properties within 100m of 110kV UGC construction works area (upslope and downslope)	**No. of private wells located downslope of construction works area**	**Located along public water supply? Yes/No**
c.230 (Outside of Newport and Rearcross)	5	Yes, water mains along public roads L2166-0, R503 and L2264-50

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons, where excavation works for both the UWF Related Works and UWF Grid Connection will occur on the L2264-50 and L6166-0 local roads. There is 1 No. well located within 100m downstream of both works locations (GSI well 1715NEW064).

11.4.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 11.4.2.2.1.

11.4.2.3.3 Element 4: Upperchurch Windfarm

Not applicable – Element evaluated as excluded. See Section 11.4.2.2.1.

Consideration of the Passage of Time: There are no wells or springs within 100m downslope of Upperchurch Windfarm works, and no new wells have been bored within 100m in recent years (local consultation). Therefore, there have been no material changes in the baseline environment and the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR

11.4.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 11.4.2.2.1.

11.4.2.3.5 Other Projects or Activities

Local Wells & Springs

Sensitive Aspect

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.4.2.1.

Water

Topic

11.4.3 PROJECT DESIGN MEASURES for Local Wells & Springs

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 11-36 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect **Local Wells & Springs**.

Table 11-36: UWF Related Works Project Design Measures relevant to Local Wells & Springs

PD ID	**Project Design Environmental Protection Measure (PD)**
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
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

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 design of the UWF Grid Connection. These Project Design Measures are included in the description of the UWF Grid Connection, and can be found in this EIA Report in Appendices 5.3 in Volume C4: EIAR Appendices.

Local Wells & Springs

Sensitive Aspect

11.4.4 EVALUATION OF IMPACTS to Local Wells & Springs

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) - Local Wells & Springs.

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

Table 11-37: 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)*
No impacts included for evaluation	*Surface water and groundwater Contamination from Oils, Fuels and Chemicals (construction stage)*
	Surface water and groundwater Contamination from Cement Based Compounds (construction stage)
	Groundwater level and flow impacts (construction stage)
	Operational Stage Effects
	Operational Stage Effects

The source-pathway-receptor links and the rationale for excluded impacts are described in the section below.

Topic: **Water**

11.4.4.1 Description and Rationale for Excluded (scoped out) Impacts

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

Table 11-38: Description and Rationale for Excluded Impacts to Local Wells & Springs

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				
Storage and handling of fuels / chemicals	1,2	SW Runoff GW Flowpaths	Surface water and groundwater Contamination from Oils, Fuels and Chemicals	Rationale for Excluding: no likely impact Potential for impacts relates to UWF Grid Connection only, as there are no wells within 50m downslope of UWF Related Works or within 100m of Upperchurch Windfarm works. No likely impact of UWF Grid Connection, due to the fact that all plant and machinery will be working on an impermeable road surface, any minor spills or leaks are unlikely to percolate down into the underlying aquifer and flow towards these wells or springs (surface water more at risk). In addition, house to house calls will be conducted prior to the commencement of UWF Grid Connection works to confirm the location of wells and springs, and no refuelling of plant or equipment will be permitted within 100m of known/confirmed wells (Project Design Measure).
Use of Cement Based Compounds	1,2	SW Runoff GW Flowpaths	Surface water and groundwater Contamination from Cement Based Compounds	Rationale for Excluding: no likely impact The use of cement for the UWF Grid Connection works within 100m of 57 no. downslope properties (worst case scenario) will be limited to the trench and due to the small volumes required and the fact that no contact with the underlying groundwater is expected (i.e. dry trenches within the carriageway of road) groundwater quality effects on the downstream wells are not expected. There are 6 no. wells within 100m of UWF Related Works, all of which are located upslope of the works areas, therefore there is no potential for contamination effects.
Excavation Dewatering (i.e. cable trench de-watering)	1,2	GW Flowpaths	Groundwater level and flow impacts	Rationale for Excluding: no likely impact Due to the shallow nature of the excavation works (1.25m) it is not expected that the excavation of a shallow trench along the carriageway of a public road will impact on groundwater flows/levels in the groundwater catchment to these wells as inflows to the well are most likely from deeper bedrock.
Operational Stage Effects				
Rationale for Excluding: no likely impact due to the absence of excavations, and the minimal volumes of oils which will be present on-site during maintenance works.				
Decommissioning Stage				

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Rationale for Excluding: no likely impact due to the absence of excavations, and the minimal volumes of oils which will be present on site during decommissioning works at the Upperchurch Windfarm and UWF Related Works. UWF Grid Connection will not be decommissioned, therefore there is no potential for impacts.				

11.4.5 Mitigation Measures for Impacts to Local Wells & Springs

Mitigation measures were incorporated into the UWF Related Works project design. No additional mitigation measures are required as the topic authors conclude that **impacts to Local Wells & Springs are not likely to occur** as a consequence of the development of the UWF Related Works.

11.4.6 Evaluation of Residual Impacts to Local Wells & Springs

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 Evaluation of UWF Related Works (Section 11.4.1), i.e. **no potential for impacts.**

11.4.7 Application of Best Practice and the EMP for Local Wells & Springs

No impacts are likely to occur to Local Wells & Springs.

However, the Best Practice Measures and Surface Water Management Plan which will be implemented during the construction works for the protection of Local Surface Water Bodies (Section 11.2.7) and Local Groundwater Bodies (Section 11.3.7) will also provide further protection to Local Wells & Springs.

11.4.8 Summary of Impacts to Local Wells & Springs

The topic authors conclude that UWF Related Works is not likely to cause impacts to Local Wells & Springs.

Table 11-39: Summary of the impacts to Local Wells & Springs

Impact to Local Wells & Springs	**Impact**
Evaluation Section	*Section 11.4.4.1*
Project Life-Cycle Stage	All
UWF Related Works *Direct /indirect impact*	**No Potential for Impacts**
UWF Related Works *Cumulative Impact*	No Potential for Cumulative Impacts
Element 1: UWF Grid Connection	No likely impacts
Element 3: UWF Replacement Forestry	No potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Element 4: Upperchurch Windfarm	No potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Element 5: UWF Other Activities	No potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Cumulative Impact:	
Cumulative Impact: All Elements of the Whole UWF Project	No Likely Cumulative Impacts

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.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Local Wells & Springs with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.4.2.1).

Local Wells & Springs

Sensitive Aspect

Water

Topic

11.5 Sensitive Aspect No.4: Lower River Shannon SAC

This Section provides a description and evaluation of the Sensitive Aspect - Lower River Shannon SAC.

11.5.1 BASELINE CHARACTERISTICS of Lower River Shannon SAC

11.5.1.1 STUDY AREA for Lower River Shannon SAC

The study area for Lower River Shannon SAC in relation to the UWF Related Works is described in Table 11-40 and illustrated on Figure RW 11.5: Lower River Shannon SAC within UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 11-40: UWF Related Works Study Area for Lower River Shannon SAC

Study Area for Lower River Shannon SAC	Justification for the Study Area Extents
Bilboa River catchment divide	Defined by regional topography and drainage towards the SAC

11.5.1.2 Baseline Context & Character of Lower River Shannon SAC in the UWF Related Works Study Area

The Lower River Shannon SAC encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments, and the marine area between Loop Head and Kerry Head. The Lower River Shannon is a designated SAC and contains many Annex I habitats and Annex II species. Please refer to Chapter 8: Biodiversity for more details of this designated site. A minority of the UWF Related Works are located within the River Shannon catchment - 1.7km of the total 17.9km of the Internal Windfarm Cabling and some of the Haul Route works (HW7, HW8, HW9, HW10, as shown in Table 11-9 and Table 11-10 above) are located within the Inch (Bilboa)_010 and Bilboa_10 local surface water bodies. Both of these waterbodies are located within the Bilboa River catchment, within the Lower River Shannon regional catchment. There is only 1 no. (of the 32 no.) watercourse crossing, with regard to the UWF Related Works, within the Bilboa River catchment. No instream works are required for UWF Related Works at this watercourse crossing. Based on the EPA online data on water quality (https://gis.epa.ie/EPAMaps/), the Inch (Bilboa)_010 had Moderate to Good Status and Good status in the Bilboa_10 waterbody, while the main watercourses downstream of the development within the Lower River Shannon - the Bilboa River (Bilboa_020), also had a Good Status in terms of water quality.

11.5.1.3 Importance of Lower River Shannon SAC

The Lower River Shannon SAC is a Natura 2000 as established under the Habitats Directive and therefore it has a very high importance.

11.5.1.4 Sensitivity of Lower River Shannon SAC

The primary sensitivities are surface water quality and its water dependant ecosystems.

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

Based on the WFD surface waterbody reports for the Shannon River Lower, the Lower River Shannon waterbodies are "Probably At Risk" from diffuse sources of pollution and "At Risk" from point sources of pollution such as wastewater treatment plant surface water discharges. The SWBs are reported to be "Probably Not At Risk" from forestry related sediment input.

11.5.1.6 Receiving Environment (the Baseline + Trends)

As per the WFD status of the surface water bodies within the Lower River Shannon, it is assumed that the current qualifying features and sensitivities of the Lower River Shannon will be the existing environment.

Lower River Shannon SAC
Sensitive Aspect

11.5.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.5.2.1 Cumulative Evaluation Study Areas

11.5.2.1.1 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 Lower River Shannon SAC	Justification for the Study Area Extents
Bilboa River catchment	The Bilboa River is the catchment in which the UWF Related Works is located. The Bilboa River catchment drains to the Lower River Shannon SAC. Extending the scoping area beyond the Bilboa River catchment would mean that the whole of the Mulkear River catchment would be included and therefore at this vast scale, the UWF Related Works would likely have a Neutral effect in relation to cumulative impacts on the SAC due to the very small extent of UWF Related Works in the catchment, together with the dilution capacity of joining local surface water bodies.

The study is illustrated on Figure CE 11.5: Lower River Shannon SAC within the UWF Related Works Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

11.5.2.1.2 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 11.5.2.2.1 below.

The 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 11-41 and Figure WP 11.5: Lower River Shannon SAC within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 11-41: Whole Project Cumulative Evaluation Study Area for Lower River Shannon SAC

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	The regional Mulkear River catchment	The Mulkear River is one of the regional catchments in which all of Elements of the Whole UWF Project are located. The Mulkear River catchment drains to the Lower River Shannon SAC. Extending the scoping area beyond the Mulkear River catchment would mean that the whole of the River Shannon catchment would be included and
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5:		

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Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
UWF Other Activities		therefore at this vast scale, the Whole UWF Project would likely have a Neutral effect in relation to cumulative impacts.

11.5.2.2 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Lower River Shannon SAC 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 Lower River Shannon SAC 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 A2.3.2.11).

The results of this scoping exercise are that: Bunkimalta Windfarm (consented) has been scoped in for evaluation of cumulative effects to Lower River Shannon SAC.

11.5.2.2.1 Potential for Impacts to Lower River Shannon SAC

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 Lower River Shannon SAC. The results of this evaluation are included in Table 11-42.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure CE 11.5. The baseline character of the areas around these Elements is described in Section 11.5.2.3.

Table 11-42: 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 due to the location of the UWF Replacement Forestry outside of the regional Mulkear River catchment.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral effect/No potential for effects due to: • The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no hydrological / water quality effects are likely. • Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore, no surface water or groundwater impacts are expected. • Monitoring Activities do not require any major construction activities. Therefore, no surface water or groundwater impacts are expected. Once off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality.

	• During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore no water quality effects are expected.
Other Projects or Activities	
Bunkimalta Windfarm	Yes, included for the evaluation of cumulative sedimentation effects from tree felling, earthworks, dewatering, directional drilling and watercourse crossing works. Evaluated as excluded: Neutral cumulative water quality effects from oils/cement contamination - due to the implementation of best practice oil, fuel and cement measures as stated in the Bunkimalta Windfarm EIS.

11.5.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.5.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

UWF Grid Connection: The Mountphilips Substation site and the majority of the 110kV UGC (27.4km of the total 28.9km) are located within the River Shannon surface water catchment. The River Shannon downstream of the 110kV UGC route is a designated SAC (i.e. Lower River Shannon SAC). The UWF Grid Connection (110kV UGC) is located within the SAC boundary at six locations, over a total distance of 653m, as follows;

- 22m over the Newport River (Watercourse Crossing W4) at Newport Bridge in the town of Newport
- 35m over the Bilboa River (Watercourse Crossing W48) at Anglesey Bridge near Kilcommon.
- 26m length of public road (L2166-0) on Black Road in Newport
- 100m, 80m and 390m length of public road (R503) to the east of Rear Cross

All trenching works at the Newport Bridge and Anglesey Bridge will be carried out in the bridge structure and no instream works will be required.

All trenching works on the R503 public road, where it overlaps the SAC boundary, will be carried out in the public road pavement and no instream works, or off-road works, will be required.

In total, within the River Shannon catchment, there are 58 no. (of 63 no.) watercourse crossings along the 110kV UGC route. The majority of the watercourse crossings are existing bridges and culverts.

The Lower River Shannon is a designated SAC and contains many Annex I habitats and Annex II species. Please refer to Chapter 8: Biodiversity for more details of this designated site. Based on the WFD/EPA mapping (www.catchments.ie), the main watercourses downstream of the development within the Lower River Shannon such as the Newport (Mulkear) River (Newport_040), Clare River (Annagh_030) and the Bilboa River (Bilboa_020) have a Good Status in terms of water quality.

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Inch (Bilboa)_010 and Bilboa_10 waterbodies within the Bilboa River catchment.

11.5.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – element evaluated as excluded. See Section 11.5.2.2.1.

11.5.2.3.3	Element 4: Upperchurch Windfarm

In relation to the Upperchurch Windfarm, similar to the UWF Related Works, only a small portion of the Upperchurch Windfarm is located in the River Shannon catchment with only 2 no. of the 22 no. Consented UWF turbines and associated UWF Access Roads located in the catchment.

Consideration of the Passage of Time: A small proportion of the footprint of Upperchurch Windfarm will occur in the Bilboa River catchment. A review of EPA data shows that there has been no material change in water quality in the Bilboa River catchment (EPA WFD River Q Values 1971 – 2017) and therefore and the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

11.5.2.3.4	Element 5: UWF Other Activities

Not applicable – element evaluated as excluded. See Section 11.5.2.2.1.

11.5.2.3.5	Other Projects or Activities: Consented Bunkimalta Windfarm

Bunkimalta Windfarm (consented): is located within the Newport (Mulkear) River catchment and the Clare River catchment with 5 no. turbines of this consented windfarm development within the Clare River sub-catchment and the remaining 11 no. turbines located within the Newport River (Mulkear) catchment. The windfarm is located upstream of the UWF Grid Connection.

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11.5.3 PROJECT DESIGN MEASURES for Lower River Shannon SAC

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 11-43 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect **Lower River Shannon SAC**.

Table 11-43: UWF Related Works Project Design Measures relevant to Lower River Shannon SAC

PD ID	Project Design Environmental Protection Measure (PD)
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.
PD12	A phased approach will be undertaken in relation to watercourse crossing works, earthworks 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. Spoil excavations from public roads being transported to landfill will be covered during transport.
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, for UWF Related Works, 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

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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.

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.

Lower River Shannon SAC

Sensitive Aspect

11.5.4 EVALUATION OF IMPACTS to Lower River Shannon SAC

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) - Lower River Shannon SAC.

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

Table 11-44: 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)***
Surface water quality impacts due to tree felling (in conifer plantations), (Construction Stage)	*Surface Water Quality Impacts due to Nutrient Input (construction stage)*
Surface water quality impacts due to earthworks (excavations and overburden storage)	*Increased flood risk (Operational Stage)*
Surface water quality impacts from dewatering of excavations (Construction Stage)	*Suspended Solid Input (Operational Stage)*
Surface water quality impacts from watercourse crossing works (Construction Stage)	*Decommissioning Stage Effects*
Surface water quality impacts during directional drilling works (Construction Stage)	
Water quality impacts from fuels, oils and chemicals, (Construction Stage)	
Water quality impacts from cement-based compounds, (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 11.5.4.1 to 11.5.4.6.**

Cumulative evaluation with Other Projects is presented in Section 11.5.4.7.

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 11.5.4.8.

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11.5.4.1 Impact Evaluation Table: Surface water quality impacts due to tree felling

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Tree felling activities Cumulative Impact Source: Tree felling activities in relation to Other Elements, tree felling, Earthworks and Watercourse Crossing Works in relation to Other Projects. Impact Pathway: Runoff and surface water flowpaths Impact Description: Surface water quality impacts from sediment release in surface water runoff during coniferous felling operations within the River Shannon catchment. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Surface water quality impacts due to tree felling	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: None	
Significance of the Impact: No impact	
Rationale for Impact Evaluation: • No tree felling required for the UWF Related Works within the River Shannon catchment	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: None	
Significance of the Cumulative Impact: No Potential for Cumulative Impact	
Rationale for Cumulative Impact Evaluation: • No felling required for UWF Related Works in the Shannon regional catchment	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
Impact Magnitude: None	
Significance of the Impact: No Impact	
Rationale for Impact Evaluation: • No felling required for UWF Grid Connection	
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.5.2.2.1*	
Element 4: Upperchurch Windfarm	
Impact Magnitude: None	
Significance of the Impact: No impact	
Rationale for Impact Evaluation:	

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• No tree felling required for Upperchurch Windfarm within the River Shannon catchment
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.5.2.2.1*
Evaluation of Other Cumulative Impacts – Surface water quality impacts due to tree felling
Whole UWF Project Effect
Cumulative Impact Magnitude: None
Significance of the Cumulative Impact: No Cumulative Impact
Rationale for Cumulative Impact Evaluation: • No forestry felling required for any Element of the Whole UWF Project in the River Shannon catchment.

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11.5.4.2 Impact Evaluation Table: Surface water quality impacts due to earthworks (excavations and overburden storage)

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Earthworks and groundwork

Cumulative Impact Source: Earthworks and groundwork in relation to Other Elements, tree felling, Earthworks and Watercourse Crossing Works in relation to Other Projects.

Impact Pathway: Runoff and surface water flowpaths

Impact Description: Indirect surface water quality impacts on the SAC from entrained sediment in surface water runoff arsing during excavations and groundwork associated with construction works. There will also be a requirement for temporary and permanent overburden storage areas along the construction works area and these storage areas also have the potential to create entrained sediment in runoff as a result of their erosion.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface water quality impacts due to earthworks (excavations and overburden storage

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:

UWF Related Works within the River Shannon catchment will include 1.7km of Internal Windfarm Cabling (of the total 17.9km) and Haul Route works (HW7 - HW10) at 3 no. locations which mainly involves public road widening. Temporary storage of overburden relating to excess material excavated from the Internal Windfarm Cabling within the River Shannon catchment will amount to approximately 498m^3 of material. No permanent storage of overburden is proposed within the Lower River Shannon catchment.

Due to the relatively small scale of the UWF Related Works within the River Shannon catchment, the magnitude of impact is considered to be **Negligible**.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High Importance** of the SAC;
- The small footprint area of the construction works within the regional River Shannon catchment;
- The majority of the 1.7km of the cabling will be installed within the consented UWF Access roads, and therefore this reduces overall excavation requirements;
- The majority of the UWF Related Works within the River Shannon catchment are more than 50m from a watercourse (there is only 1 no. watercourse crossing in the River Shannon catchment); and,
- The effects are likely to be brief to temporary in duration and reversible in nature

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects in the catchment of the Lower River Shannon SAC relates to the following local waterbodies: Inch (Bilboa)_10 and Bilboa_010 local surface water bodies which are both within the River Bilboa catchment.

In the Bilboa River catchment works involving excavations will be required for UWF Related Works, and for UWF Grid Connection and Upperchurch Windfarm. In addition, temporary and permanent storage of excavated material (overburden) will be required for UWF Related Works and Upperchurch Windfarm where total overburden storage within the Bilboa River catchment will be: up to 9,080m^3 of permanently stored overburden and up to 11,400m^3 temporarily stored overburden. It is possible that erosion of these storage areas could result

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in surface water quality impacts locally. It is worth noting that there will be no storage of overburden material required for UWF Grid Connection in the Bilboa River catchment as all material excavated from the 110kV UGC trench will be removed to landfill.

Due to the transient and spread out nature of the UWF Related Works, Upperchurch Windfarm and UWF Grid Connection and the fact that most of the local watercourses, in the Bilboa River catchment, are drains or marginal watercourses (Class 3 or Class 4), the magnitude of impact is considered to be Negligible.

There is no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the local surface water bodies;
- In-combination effects on surface water quality within Bilboa River catchment, within the Lower River Shannon SAC catchment, are likely to be negligible due to the small extent of in-combination works in this catchment – i.e. the majority of UWF Related Works, Upperchurch Windfarm and UWF Replacement Forestry are located in the Suir catchment, which limits the potential for cumulative impacts.
- Temporary nature of the works

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

Element 1: UWF Grid Connection

Impact Magnitude:
The potential for water quality effects will arising during earthworks required for the 110kV cable trench (27.4km of 28.9km are within the catchment area of the Lower River Shannon SAC), joint bays new permanent access road, 1 no. temporary compounds and the Mountphilips Substation and End Masts.

In total, up to 3,770m^3 of overburden from excavations at Coole and Mountphilips (for Mountphilips Substation, and associated access road, End Masts and 110kV UGC between the Site Entrance in Coole to the Mountphilips Substation) will be permanently stored within the construction works area as linear berms. Erosion of these storage areas potentially could result is surface water quality impacts on the downstream SAC.

There will be no storage of overburden material required for the 110kV UGC where it occurs on public road outside of the Mountphilips Substation site, as all material excavated from the 110kV UGC trench will be removed to landfill.

Due to the large downstream distance from the majority of the works areas, the assimilative capacity provided by local watercourses along with the distributed and transient nature of the works upstream of the SAC, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- The working footprint will be spread out over a large geographical area (latitudinal distance of 28.9km) within the River Shannon catchment; All excavated material from public roads as a result of the UWF Grid Connection will be removed to landfill, therefore there will be no overburden of material arising from excavation in the public road.
- Approx. 3,770m^3 (from excavations at Coole/Mountphilips) will be stored at Mountphilips Substation in the form of a linear berm around the substation and along new access road. Berms will be seeded immediately (Project Design Measure).

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- The majority of the watercourses intercepted by the works area (78%) are drains or marginal headwater watercourses with low flows, and therefore the effectiveness of them acting as a surface water flow-path to the downstream Lower River Shannon SAC is limited;
- The transient nature of the works within local surface water bodies upstream of the SAC;
- As discussed in Section 11.2.4, impacts on local surface water bodies are only expected to be (Imperceptible to Slight), and therefore effects on the Lower River Shannon SAC are expected to be of lower significance due to the larger downstream distance and dilution capacity of local surface water bodies;
- All works within the SAC will be confined to public road surface, and where works traversing the Newport Bridge and Anglesey Bridge, will be confined to the bridge;
- All effects will be brief to temporary in duration and reversible.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.5.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology Chapter) and the Sediment and Erosion and Control Plan from the 2013 EIS, release of sediment during the construction phase is likely to have a negative effect on the River Shannon and its tributaries.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- A process of mitigation by design was adopted by the Upperchurch Windfarm design team whereby all the windfarm infrastructure including overburden storage areas are located more than 50m from a stream and 20m from a drain (with the exception of the 1 no. watercourse crossing); and,
- The measures outlined in the EIS and within the Sediment and Erosion and Control Plan will ensure the development of the wind farm will not have a significant negative impact on the surface water quality.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.5.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Projects: Consented Bunkimalta Windfarm
- Please refer to Section 11.5.4.7 for cumulative information and evaluation

Evaluation of Other Cumulative Impacts – Surface water quality impacts due to earthworks (excavations and overburden storage)

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Cumulative Impact Magnitude:
Excavations for UWF Grid Connection, UWF Related Works and Upperchurch Windfarm will take place with the catchment area of the Lower River Shannon SAC. The majority of these works will relate to the UWF Grid Connection works. However, any effects will be brief to temporary, and the UWF Grid Connection works in the catchment generally comprise trenching works in public road pavements and in bridge structures.

WF Related Works and Upperchurch Windfarm will not contribute significantly to works in the River Shannon catchment, due to the fact that the majority of the UWF Related Works and Upperchurch Windfarm are located in the River Suir catchment, the cumulative magnitude of impact is expected to remain at **Negligible.**

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High Importance** of the SAC;

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- The majority of UWF Grid Connection construction works areas are contained within the River Shannon catchment while the majority of the Upperchurch Windfarm and UWF Related Works are located in the River Suir catchment;
- The majority of the UWF Related Works within the River Shannon catchment are more than 50m from a watercourse (there is only 1 no. watercourse crossing in the River Shannon catchment and no in-stream works at this crossing);
- The Upperchurch Windfarm will have a Sediment and Erosion and Control Plan, and therefore no significant effects on the Lower River Shannon SAC are anticipated; and,
- Therefore, the in-combination effects on surface water quality at the downstream Lower River Shannon SAC will be negligible.

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

- *Please refer to Section 11.5.4.7 for cumulative evaluation*

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11.5.4.3 Impact Evaluation Table: Surface water quality impacts from dewatering of excavations

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Excavation Dewatering Cumulative Impact Source: Excavation Dewatering in relation to Other Elements, tree felling, Earthworks and Watercourse Crossing Works in relation to Other Projects. Impact Pathway: Runoff and surface water flowpaths Impact Description: There will be a requirement to have the trench for the 110kV UGC and Internal Windfarm Cabling dry prior adding of the granular cement. Any pumped water (from groundwater inflows and from surface water) will likely have high levels of sediments and therefore has the potential to impact on local surface water quality Impact Quality: Negative	
Evaluation of the Subject Development Impact – Surface water quality impacts from dewatering of excavations	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: Only 1.7km of the Internal Windfarm Cabling is located within the River Shannon catchment, and no dewatering is expected based on the trial pits undertaken at the windfarm site which were dry.	
Significance of the Impact: No Impact	
Rationale for Impact Evaluation: • No dewatering with respect to the UWF Related Works are anticipated.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Inch (Bilboa)_10 and Bilboa_010 local surface water bodies which are both within the Bilboa River catchment of the larger Lower River Shannon catchment. No excavation dewatering is expected for Internal Windfarm Cabling or the Upperchurch Windfarm due to the upland location of the works and based on the results of trial hole investigations at the windfarm site which had no groundwater inflows. No significant excavation dewatering is expected for the UWF Grid Connection as the route is largely along the carriageway of public roads. Any effects are likely to be negligible. No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.	
Significance of the Cumulative Impact: Imperceptible	
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC; and, • No significant dewatering requirements are likely.	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	

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Impact Magnitude:

The River Shannon SAC extends as far upstream as the Newport (Mulkear) River and Bilboa River watercourse crossing locations and is also mapped along the public road at 4 locations (1 short section on the L2166-0 Black Road in Newport, and 3 short sections of the R503 regional road to the east of Rearcross village).

No significant excavation dewatering is expected for the UWF Grid Connection as the route is largely along the carriageway of public roads which has road drainage in place.
Regardless all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag along the roadside verge away from any local watercourses (Project Design Measure), the effects are likely to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- There will be no direct discharge of pumped water into any watercourse or drain (Project Design Measure). All pumped water will be treated using a mobile water treatment train and a silt bag prior to discharge along the roadside verge;
- The route of the 110kv is largely along the carriageway of public roads and therefore significant trench dewatering is not anticipated;
- Along sensitive areas of the 110kv route (i.e. where the smaller watercourses being crossed drain directly into the Clare River (W8 – W31) and the Bilboa River (W41 – W48)), trench work will only be completed during the spring/summer months when ground conditions are typically dryer (Project Design Measure);
- All existing roadside drains/drainage routes within the trench works area will be temporarily blocked to capture any pumped water / surface water runoff and a row of silt fencing will be placed along the downslope verge of the road (Project Design Measure);
- Works will not be completed during extreme or prolonged rainfall events in order reduce the risk of surface water inflows into the trench; and,
- All effects will be localised, brief to temporary in duration and reversible

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.5.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology) of the 2013, limited and discontinuous seepage is expected from the sides of the turbine bases in sloping ground, and this is more likely to occur wetter winter periods. No significant effects on surface water quality were identified as a result of excavation dewatering.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Only 2 no. turbines are located within the River Shannon catchment;
- Use of interceptor drainage to prevent runoff entering excavations;
- All pumped water must be captured and treated; and,
- There will be direct discharge of treated pumped water into the existing drainage network

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.5.2.2.1*

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Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Projects: Consented Bunkimalta Windfarm - Please refer to Section 11.5.4.7 for cumulative information

Evaluation of Other Cumulative Impacts – Surface water quality impacts from dewatering of excavations
Whole UWF Project Effect
Cumulative Impact Magnitude: Excavations for UWF Grid Connection, UWF Related Works and Upperchurch Windfarm will take place with the catchment area of the Lower River Shannon SAC. Significant dewatering is not expected for any element of the project, and therefore the impact magnitude will be **Negligible**
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • No significant excavation dewatering is likely for any of the project elements within the River Shannon catchment; • Given that any pumped water from UWF Related Works will be treated and then discharged at a location away from any local watercourses (**Project Design Measure**), no significant effects are expected; and, • All pumped water will be treated using a mobile water treatment train and a silt bag prior to discharge along the roadside verge • Along sensitive areas of the 110kv route (i.e. where the smaller watercourses being crossed drain directly into the Clare River (W8 – W31) and the Bilboa River (W41 – W48)), trench work will only be completed during the spring/summer months when ground conditions are typically dryer (Project Design Measure); and, • All effects will be localized and brief to temporary in nature.
All Elements of the Whole UWF Project with Other Projects or Activities - *Please refer to Section 11.5.4.7 for cumulative evaluation*

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11.5.4.4 Impact Evaluation Table: Surface water quality impacts from watercourse crossing works

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Watercourse Crossing Works Cumulative Impact Source: Watercourse Crossing Works in relation to Other Elements, tree felling, Earthworks and Watercourse Crossing Works in relation to Other Projects. Impact Pathway: Surface water downstream of the works area Impact Description: Indirect surface water quality impacts as a result of sediment release during in-stream works such as open trenching for the cabling and culvert emplacement / replacement within watercourses upstream of the Lower River Shannon SAC within the River Shannon catchment. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Surface water quality impacts from watercourse crossing works	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: There is only 1 no. watercourse crossing in relation to the UWF Related Works however no in-stream works are required for this crossing and therefore no effects on the SAC are expected.	
Significance of the Impact: No Impact	
Rationale for Impact Evaluation: • There is only 1 no. watercourse crossing for the UWF Related Works in the River Shannon catchment, no instream works are required.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: Due to the fact that there are no instream works required for the 1 no. watercourse crossing on the UWF Related Works site within the Bilboa River catchment, it is considered that there is no potential for in-combination effects.	
Significance of the Cumulative Impact: No cumulative impact	
Rationale for Cumulative Impact Evaluation:No instream works for the UWF Related Works required in the Bilboa River catchment.	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
Impact Magnitude: Approximately 27.4km of the total 28.9km 110kV UGC is located within the River Shannon Catchment. There are 58 no. watercourse crossings within the River Shannon catchment and in-stream works will potentially be required at 26 no. of these locations. Instream works will relate to the replacement of existing culverts in the road. Water quality effects can potentially occur occasionally downstream during the crossing works. Due to the fact that instream works only largely require culvert replacement, the assimilative capacity provided by local watercourses along with the distributed and transient nature of the works upstream of the SAC, the magnitude of impact is considered to be Negligible.	
Significance of the Impact: Imperceptible	

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Rationale for Impact Evaluation: • As per Table 11-7**,** Negligible magnitude combined with the Extremely High Importance of the SAC;The majority of the watercourses (78%) intercepted by the UWF Grid Connection upstream of the SAC are drains or marginal watercourses which have typically low flows, and therefore the effectiveness of them acting as surface water flowpaths to the downstream SAC is limited; • As assessed in Section 11.2.4.5, impacts on local surface water bodies (immediately downstream of the crossings works) are only expected to be Imperceptible to Slight and therefore effects on the downstream Lower River Shannon SAC are expected to be of much lower significance because (1) the large geographical distribution of the watercourse crossings within several local surface water bodies upstream of the SAC and (2) high assimilative capacity of the rivers within the SAC downstream of the works (i.e. Newport (Mulkear) River, Clare River and Bilboa River); • The transient nature of the watercourse crossing works within local surface water bodies upstream of the SAC; and, • All effects will be brief to temporary in nature and reversible.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.5.2.2.1*
Element 4: Upperchurch Windfarm
Impact Magnitude: There is no watercourse crossing relating to Upperchurch Windfarm in the River Shannon catchment. Therefore, there is no potential for impact.
Impact Evaluation: No Impact
Rationale for Impact Evaluation: • There is no watercourse crossing relating to Upperchurch Windfarm in the River Shannon catchment.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.5.2.2.1*
Cumulative Information: Individual Evaluations of Other Projects or Activities
Other Projects: Consented Bunkimalta Windfarm - Please refer to Section 11.5.4.7 for cumulative information
Evaluation of Other Cumulative Impacts – Surface water quality impacts from watercourse crossing works
Whole UWF Project Effect
Cumulative Impact Magnitude: Watercourse crossing works in the River Shannon Regional Catchment are only associated with the UWF Grid Connection. No Instream works required for any other elements of the whole windfarm project in the River Shannon Regional catchment. The whole project impact magnitude will be as per UWF Grid Connection impact magnitude above. The cumulative magnitude of impact will be **Negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High Importance** of the SAC, • Watercourse crossings works within the River Shannon are exclusively associated with the 110kV UGC.
All Elements of the Whole UWF Project with Other Projects or Activities - *Please refer to Section 11.5.4.7 for cumulative evaluation*

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11.5.4.5 Impact Evaluation Table: Water quality impacts from fuels, oils and chemicals

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Fuel, oils and chemicals Cumulative Impact Source: Fuel, oils and chemicals Impact Pathway: Runoff and surface water flowpaths Impact Description: The plant and equipment that will be used during the construction phase will be run on fuels and oils. This creates the potential for spillage and leakage of hydrocarbons from plant during refuelling or storage of oils and fuels which can impact on downstream SAC. The drilling rigs that will be used at the Newport (Mulkear) River and Bilboa River crossing will be ran on hydrocarbons and will require refuelling adjacent to the SAC. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Water quality impacts from fuels, oils and chemicals	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: Only 1.7km of the Internal Windfarm Cabling is located within the River Shannon catchment and effects on the downstream SAC are unlikely due to the small volumes that will be present on-site at any one time, and the transient nature of the works.	
Significance of the Impact: No Impact	
Rationale for Impact Evaluation: • The volumes on-site will be very small, and therefore no effects are expected.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: The potential for cumulative effects in the River Shannon Regional catchment relates to the following local waterbodies: Inch (Bilboa)_10 and Bilboa_010 local surface water bodies, where UWF Related Works, Upperchurch Windfarm and UWF Grid Connection construction works will take place. Contamination effects from oil/fuel leakages from construction machinery or from storage areas are unlikely to occur but there is potential for isolated incidents. No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works. Given the distributed nature of the works within several local sub-catchments and the fact that only small volumes of fuel/oil will be present on-site at any one time, the in-combination magnitude of effect is considered to be Negligible.	
Significance of the Cumulative Impact: Imperceptible.	
Rationale for Cumulative Impact Evaluation: As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the local surface water bodies; the distributed nature of the works within several local sub-catchments and the fact that only small volumes of fuel/oil will be present on-site at any one time; A Fuel and Oil Management Plan is proposed for the Upperchurch Windfarm which will include storage requirements and emergency procedures for dealing with any spills and leaks; The additional volumes of oils and fuels that will be present on the Upperchurch Windfarm site as a result of the UWF Related Works will be negligible;	

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The UWF Replacement Forestry is not likely to contribute to in-combination effects with respect to impacts from oils and fuels; and,
Effects are likely to be due to small isolated localised spills (worst case) that are very unlikely to contribute to in-combination water quality effects within the local surface water catchments.

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

Element 1: UWF Grid Connection

Impact Magnitude:
Plant and equipment will be used at all UWF Grid Connection construction works areas and therefore the Lower River Shannon SAC a potential receptor. The majority of the 110kV UGC is located in the River Shannon catchment.
However, any spills or leaks are likely to be minor (worst case), isolated and occur rarely. Given that the worst-case effects on local surface water bodies has been assessed to be Negligible (see Section 11.2.4.7) and the fact that the majority of the UWF Grid Connection construction works areas are upstream of the SAC (with the exception of the Newport (Mulkear) River and Bilboa River crossings and 4 No. short stretches along the public road, which are located within the SAC boundary), the worst-case effect on the SAC is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- Only relatively small volumes of fuels / oils will be on-site at any one time and therefore no significant effects on local surface water bodies are expected (Refer to Section 11.2.4.7);
- Refueling will not be permitted within 100m of watercourses (Project Design Measure);
- Any spills along the 110kV UGC are likely to be small isolated incidents and comprise very small amounts, and the actual residual volumes that might reach the downstream Lower River Shannon SAC are likely to be negligible if any.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.5.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology Chapter) the potential for water quality effects arises from the use and storage of oil and fuels and surface waters downslope of the site can be affected. The effects were considered to be Not Significant for tributaries of the River Shannon.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
- A Fuel and Oil Management Plan will be implemented which will detail storage requirements and emergency procedures for dealing with any spills and leaks; and,
- In addition, it should be noted that only 2 no. of the 22 no. consented UWF turbines are located within the River Shannon catchment.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.5.2.2.1*

Evaluation of Other Cumulative Impacts – Water quality impacts from fuels, oils and chemicals

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Cumulative Impact Magnitude:
Fuels and oils will be required for construction machinery and equipment used for UWF Grid Connection, UWF Related Works and Upperchurch Windfarm works which will take place with the catchment area of the Lower River Shannon SAC. Given that the majority of the UWF Grid Connection is located within the River Shannon catchment and the majority of the UWF Related Works and the Upperchurch Windfarm is located within the

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River Suir catchment, the in-combination magnitude of effect will be as per the UWF Grid Connection which is **Negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • The use of fuels, oils and chemicals within the River Shannon catchment will comprises minor volumes over a large geographical area within several local surface water bodies; • The volumes of oils, fuels and chemicals present within the River Shannon catchment in relation to the UWF Related Works and Upperchurch Windfarm will also be very small; and, • Any spills and leaks that do occur (if any) are likely to be small isolated incidents and therefore the potential for cumulative effects on the Lower River Shannon SAC is negligible.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.5.2.2.1).

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11.5.4.6 Impact Evaluation Table: Water quality impacts from cement-based compounds

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Cement based compounds Cumulative Impact Source: Cement based compounds Impact Pathway: Runoff and surface water flowpaths Impact Description: Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the protected species and habitats within the SAC. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Water quality impacts from cement-based compounds	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: The use of cement-based compounds will be limited to the Telecom Relay Pole foundation (c.4m^3) and 9 no. road crossings, all of which are within the River Suir catchment area. Therefore, there is no potential for impacts to the Lower River Shannon SAC.	
Significance of the Impact: No Impact	
Rationale for Impact Evaluation: • No cement based compounds will be required for UWF Related Works where it overlaps the catchment area of the Lower River Shannon SAC.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: There is no cement-based compounds used in the River Shannon Regional catchment in relation to UWF Related Works, Therefore there is no potential for cumulative effect on the River Shannon Regional catchment.	
Significance of the Impact: No Cumulative Impact	
Rationale for Impact Evaluation: No cement-based compounds required for UWF Related works in the River Shannon Regional catchment	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
Impact Magnitude: Given that the worst-case effects on local surface water bodies has been assessed to be Negligible (see Section 11.2.4.7) and the fact that the majority of the UWF Grid Connection construction works area are upstream of the SAC (with the exception of c.653m of the 110kV UGC which overlaps the SAC boundary at the Newport (Mulkear) River and Bilboa River bridge crossing and 4 no. short stretches along the L2166-0 and R503 public roads no in-stream works are proposed), the worst-case effect on the SAC is considered to be Negligible.	
Significance of the Impact: Imperceptible	

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Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- Only relatively small volumes of cement-based compounds will be on-site at any one time, and therefore no significant effects on local surface water bodies are expected (Refer to Section 11.2.4.8);
- Any spills along the 110kV UGC are likely to be small isolated incidents and comprise very small amounts, and the actual residual volumes that might reach the downstream Lower River Shannon SAC are likely to be negligible;
- Prior to importing cement, all existing roadside drains and other drainage pathways will be temporarily blocked along sections of the 110kv route that overlap the SAC (Project Design Measure);
- The sections of trenches that overlap the SAC along the R503 will be lined with an impermeable geotextile to prevent potential migration of cement from the trench base/sides (Project Design Measure);
- A member of CIEEM and the Institute of Fisheries Management will be present for all concrete pours within the SAC overlapping Sections (Project Design Measure);
- The volume of cement that will be used within the SAC boundary will be small (c.250m^3), and in the context of the location of the trench in the public road pavement;
- No in-stream works are at any of the locations of the 110kV UGC within the SAC boundary, and therefore there will be no placement of cement within the river channels or riparian habitat within the SAC.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.5.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology) of the 2013 EIS, there is a risk of spillage and runoff from cement during placing of concrete and also during washing out of chutes. The use of cement will mainly be used for turbine base construction. In addition, only 2 no. turbines of the 22-no. permitted are located within the River Shannon catchment. The effects on tributaries within the River Shannon were assessed to be Not Significant.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- During pouring containment measures will be put in place to keep cement within the foundation area and prevent it entering the local drainage routes;
- Washing of truck will be limited to the chutes, and a dedicated concrete washout area will be available on-site,
- In addition, please note only 2 no. of the 22 no. permitted turbines are located within the River Shannon catchment.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.5.2.2.1*

Evaluation of Other Cumulative Impacts – Water quality impacts from cement-based compounds

Topic: **Water**

Whole UWF Project Effect

Cumulative Impact Magnitude:
Cumulative effects from cement-based compounds for the Whle UWF Project relates to concrete used in Consented UWF Turbine foundations along with concrete used for the UWF Grid Connection 110kV UGC and for foundations at Mountphilips Substation. Given that the majority of the UWF Grid Connection is located within the River Shannon catchment and the majority of the Upperchurch Windfarm is located within the River Suir catchment, the in-combination magnitude of effect will be as per the UWF Grid Connection which is **Negligible**.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC;
- The use of cement-based compounds within the River Shannon catchment will comprises minor volumes over a large geographical area within several local surface water bodies;
- The volumes of cement-based compounds present within the River Shannon catchment in relation to the Upperchurch Windfarm will also be small (only 2 No. Consented UWF Turbines will be constructed within the catchment area of the Lower River Shannon SAC); and,
- Any spills that do occur are likely to be small isolated incidents and therefore the potential for cumulative effects is negligible.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.5.2.2.1).

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11.5.4.7 Cumulative Impacts Evaluation: Surface Water Quality Effects from Suspended Sediments

Cumulative Impact Description

Project Stage	Construction Stage

Source: Tree felling, Earthworks and Watercourse Crossing Works
Cumulative Source: Earthworks and Watercourse Crossing Works

Cumulative Impact Description:
Indirect surface water quality impacts as a result of watercourse crossings, earthworks, groundworks and storage of overburden associated with UWF Related Works, and UWF Grid Connection (110kV UGC) elements of the Whole UWF Project, and the Bunkimalta Windfarm.

Impact Quality: Negative

Individual Evaluation of the UWF Related Works and Other Elements and Other Projects

Element 2: UWF Related Works – direct/indirect impact

UWF Related Works Impact Magnitude:
UWF Related Works within the River Shannon catchment will include 1.7km of Internal Windfarm Cabling (of the total 17.9km), and Haul Route works at 3 no. locations which mainly involves public road widening. Any effects on the SAC are likely to be **Negligible**.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, **Imperceptible** magnitude combined with the **Extremely High** Importance of the SAC;
- The small footprint area of the works within the River Shannon catchment;
- The majority of the 1.7km of the cabling will be installed within the Consented UWF access roads, and therefore this reduces overall excavation requirements;
- The majority of the UWF Related Works within the River Shannon catchment are more than 50m from a watercourse (there is only 1 no. watercourse crossing in the River Shannon catchment, no instream works required); and,
- The effects are likely to be brief to temporary in duration and reversible in nature.

Element 1: UWF Grid Connection

UWF Grid Connection Impact Magnitude:
Mountphilips Substation and 27.4km (of 28.9km) of the 110kV UGC are located within the River Shannon catchment, with the vast majority of works upstream of the Lower River Shannon SAC
Due to the large geographical spread and transient nature of the works within the River Shannon catchment, the distance from the majority of the works to the SAC and the Project Design Measures which will protect water quality in the SAC, the magnitude of impact is likely to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Imperceptible magnitude combined with the Extremely High Importance of the SAC;
- The working footprint is spread out over a large geographical area (27.4km) within the River Shannon catchment;The majority (78%) of the watercourses along the 110kV UGC are drains or marginal head-water watercourses with low flows, and therefore the effectiveness of them acting as a surface water flowpaths to the downstream Lower River Shannon SAC is limited;
- The transient nature of the works within local surface water bodies upstream of the SAC;

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- As summarised in Section 11.2.4.10, impacts on local surface water bodies are only expected to be Imperceptible to Slight, and therefore effects on the downstream Lower River Shannon SAC are expected to be of lower significance; and,
- All effects will be brief to temporary in duration and reversible

Element 4: Upperchurch Windfarm

UWF Impact Magnitude:
Based on Chapter 15 (Hydrology Chapter) and the Sediment and Erosion and Control Plan from the 2013 EIS, release of sediment during the construction phase is likely to have a negative effect on the River Shannon and its tributaries (i.e. The Bilboa River)

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Firstly, only 2 no. of the 22 no. Consented UWF turbines are located within the River Shannon catchment;
- A process of mitigation by design was adopted by the Consented Windfarm design team whereby all the windfarm infrastructure is located more than 50m from a stream and 20m from a drain (with the exception of watercourse crossings); and,
- The measures outlined in the EIS and within the Sediment and Erosion and Control Plan will ensure the development of the wind farm will not have a significant negative impact on the surface water quality.

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Bunkimalta Windfarm

Bunkimalta Impact Magnitude: The Bunkimalta Windfarm is located upstream of the Lower River Shannon SAC within the Newport River catchment and the Clare River catchment. Temporary effects are likely at the downstream SAC. The Bunkimalta Windfarm grid connection is also located in the regional Mulkear catchment.

Significance of the Impact: Not Significant, as reported in the Bunkimalta WF EIS (2013)

Rationale for Impact Evaluation:

- Construction activities will be at least a minimum of 50m where possible; and,
- A Sediment Control Plan will be put in place during the construction phase to control runoff from the site;

Evaluation of Other Cumulative Impacts – Surface Water Quality Effects from Suspended Sediments

Cumulative Impact Magnitude: **Negligible**

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- The transient nature of the 110kV UGC works upstream of the SAC;
- The small scale of the UWF Related Works and the Upperchurch Windfarm within the River Shannon catchment;
- The Sediment Control Plans that are proposed for the Bunkimalta Windfarm which will prevent significant surface water quality impacts;
- The large catchment area of the Mulkear River (~650km^2) catchment and the inherent high assimilative capacity of the Lower River Shannon; and,
- The Bunkimalta Windfarm grid connection is along public roads and therefore impacts on surface water quality are not expected.

11.5.4.8 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 the table below.

Table 11-45: Description and Rationale for Excluded Impacts to Lower River Shannon SAC

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				
Tree felling in Conifer Plantations Afforestation	2, 4	SW Runoff	Surface Water Quality Impacts due to Nutrient Input	Rationale for Excluding: Neutral effect. The surface water quality effects on local surface water bodies from sedimentation as a result of tree felling for the UWF Related Works were assessed to be imperceptible to slight (refer to Section 11.2.4.2). This is due to the relatively small felling areas and the fact that the felling areas are distributed between several local catchments. Therefore, as a result of this minor impact from sediment, the nutrient loading is assessed to be Neutral. The Upperchurch Windfarm will have a Sediment Control Plan, and therefore, the potential for nutrient loading to local watercourses is assessed to be Neutral as a result of the consented drainage design measures. No felling required for UWF Grid Connection.
Operational Stage				
Runoff form Permanent hardstanding and flood risk from permanent watercourse crossing culverts	1, 2, 4	SW Flowpaths	Increased flood risk	Rationale for Excluding: Neutral effect. There are no new watercourse crossing structures within the SAC. All permanent watercourse crossing structures are on small headwater watercourses which are upstream of the SACs. Effects on local surface water bodies with respect to permanent crossings has being assessed to be imperceptible because any new or replaced culverts will be sized to cope with a 100-year flood flow as per the Project Design Measure (see Section 11.2.4.8) and therefore effects on the downstream SACs is considered to be Neutral. The effects of runoff on local surface water bodies was also assessed to be imperceptible due to the distributed nature of the permanent hardstanding infrastructure within several catchments over a large geographical area and the relatively small permanent footprint within individual local catchments (refer to Section 11.2.4.9). As such, effects on the downstream SACs will be Neutral.
Surface water quality impacts from runoff from	1,2, 4	SW Flowpaths	Suspended solid input	Rationale for Excluding: Neutral effect. Due to the distributed nature of the permanent hardstanding infrastructure within several catchments over a large geographical area, the

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
permanent hardstanding surfaces				relatively small permanent footprint within individual local catchments and the fact that silt control measures will be included at all permanent hardstanding areas (Project Design Measure), the impact on local surface water bodies is considered to be imperceptible (see Section 11.2.4.9), therefore effects on the downstream SACs are considered to be Neutral.
Decommissioning Stage Effects				
Rationale for Excluding: Scoped Out, no potential for impacts/Neutral impacts The UWF Grid Connection will remain part of the National Grid. Therefore no hydrological impacts are expected. UWF Related Works: The cables will be pulled from the Internal Windfarm Cabling ducts at the turbines or at the substation; the ducting, Realigned Windfarm Roads and Haul Route Works will remain in-situ; therefore, no decommissioning works to lands are required. The Telecoms Relay Pole will be removed, and the compound area reinstated and returned to agricultural. Neutral effects to surface or groundwater are anticipated. Upperchurch Windfarm: It is likely that the Consented UWF Substation will remain in-situ for use by ESBN and that the Consented UWF Roads will also remain in-situ for use by the landowner. Decommissioning works will be limited to the Consented UWF Turbines, Turbine Hardstanding areas, Meteorological Mast and associated drainage systems. All decommissioning works will take place from hard-core areas, with the majority of activity taking place on the turbine hardstands. Therefore, it is considered that decommissioning activities will have Neutral effects on surface water or groundwater.				

11.5.5 Mitigation Measures for Impacts to Lower River Shannon SAC

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 Lower River Shannon SAC as a consequence of the UWF Related Works.

11.5.6 Evaluation of Residual Impacts to Lower River Shannon SAC

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 Lower River Shannon SAC above (Section 11.5.4) – i.e. **no significant adverse impacts**.

11.5.7 Application of Best Practice and the EMP for Lower River Shannon SAC

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 **Lower River Shannon SAC,** 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-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

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

11.5.7.1 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 U UWF Related Works, which accompanies this planning application as Volume D.

11.5.8 Summary of Impacts to the Lower River Shannon SAC

A summary of the Impacts to the Lower River Shannon SAC is presented in Table 11-46.

Table 11-46: Summary of the impacts to the Lower River Shannon SAC

	Surface water quality impacts				Water quality impacts from	
Impact to Lower River Shannon SAC:	**due to tree felling**	**due to earthworks**	**from dewatering of excavations**	**from watercourse crossing works**	**fuels, oils and chemicals**	**from cement-based compounds**
Evaluation Impact Table	Section 11.5.4.1	Section 11.5.4.2	Section 11.5.4.3	Section 11.5.4.4	Section 11.5.4.5	Section 11.5.4.6
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction	Construction
UWF Related Works	**No Impact**	**Imperceptible**	**No Impact**	**No Impact**	**No Impact**	**No Impact**
UWF Related Works Cumulative Impact	**No Cumulative Impacts**	**Imperceptible**	**Imperceptible**	**No Cumulative Impacts**	**Imperceptible**	**No Cumulative Impacts**
Element 1: UWF Grid Connection	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible
Element 3: UWF Replacement Forestry	No Potential for Impacts - Evaluated as Excluded, see Section 11.5.2.2.1					
Element 4: Upperchurch Windfarm	No Impact	Not Significant	Not Significant	No Impact	Not Significant	Not Significant
Element 5: UWF Other Activities	No Potential for Impacts - Evaluated as Excluded, see Section 11.5.2.2.1					
Cumulative Impact:						
All Elements of the Whole UWF Project	No Cumulative Impact	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible
All Elements of the Whole UWF Project cumulatively with Other Projects or Activities Bunkimalta Windfarm	Imperceptible– See Section 11.5.4.7				N/A - evaluated as excluded, see Section 11.5.2.2.1	

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 show the totality of the project.

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11.6 Sensitive Aspect No.5: Lower River Suir SAC

This Section provides a description and evaluation of the Sensitive Aspect - Lower River Suir SAC.

11.6.1 BASELINE CHARACTERISTICS of Lower River Suir SAC

11.6.1.1 STUDY AREA for Lower River Suir SAC

The study area for Lower River Suir SAC in relation to the UWF Related Works is described in Table 11-47 and illustrated on Figure RW 11.6: Lower River Suir SAC within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 11-47: UWF Related Works Study Area for Lower River Suir SAC

Study Area for Lower River Suir SAC	Justification for the Study Area Extents
Local SWBs catchment divides within the River Suir catchment as defined by the EPA/WFD	Defined by local topography and regional drainage

11.6.1.2 Baseline Context and Character of Lower River Suir SAC in the UWF Related Works Study Area

The Lower River Suir SAC consists of all of the freshwater stretches of the Suir immediately south of Thurles, and the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many of the tributaries including the Clodiagh, the Lingaun, Anner, Nier, Tar, Aherlow and Multeen. With respect to the Whole UWF Project, the Clodaigh[4] River, Multeen River and Owenbeg River downstream of the development are within the Lower River Suir SAC.

The majority of the UWF Related Works construction works areas are located within the River Suir catchment. The majority of the construction works areas within the River Suir catchment are located locally within the Clodiagh River catchment. In terms of the watercourse crossings associated with the UWF Related Works, 31 no. of the total 32 no. are located within the River Suir catchment. Of the 31 no. watercourse crossings within the River Suir catchment, 26 no. are at least 12km upstream (Clodiagh River catchment) of the Lower River Suir SAC and the remaining 5 no. are at least 3km upstream of the SAC (Owenbeg River catchment).

11.6.1.3 Importance of Lower River Suir SAC

The Lower River Suir SAC is a Natura 2000 as established under the Habitats Directive and is therefore of very high importance.

The Lower River Suir SAC is of particular conservation interest for the presence of a number of Annex II animal species. Please refer to Chapter 8: Biodiversity for more details of this designated site.

Based on the WFD/EPA mapping (www.catchments.ie), the main watercourses downstream of the construction works within the River Suir catchment area, such as the Clodaigh River (Clodaigh_020 / 030), and the Owenbeg River (Owenbeg_010) have a Good Status in terms of water quality/ecology.

11.6.1.4 Sensitivity of Lower River Suir SAC

The primary sensitivities will be surface water quality and its water dependent ecosystems.

[4] It should be noted that **there are two Clodiagh Rivers within the catchment of the Lower River Suir SAC**; the Clodiagh River which rises in the area of the UWF Related Works and flows through the Upperchurch/Holycross area of County Tipperary, and c.60km to the southeast another Clodiagh River which rises in the Comeragh Mountains and flows through the Rathgormack/Clonea/Portlaw area of County Waterford. There is no interaction between the water catchment areas of these two rivers.

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

Based on the WFD surface waterbody reports for the Lower River Suir, the waterbodies are "Probably At Risk" from diffuse sources of pollution and "At Risk" from point sources of pollution such as wastewater treatment plant surface water discharges, IPPC sites and quarries/mines.

The SWBs are also reported to be "Not At Risk" from forestry related sediment input.

11.6.1.6 Receiving Environment (the Baseline + Trends)

As per the WFD status of the surface water bodies within the Lower River Suir, it is assumed that the current qualifying features and sensitivities of the Lower River Shannon will be the existing environment.

11.6.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.6.2.1 Cumulative Evaluation Study Areas

11.6.2.1.1 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 Lower River Suir SAC	Justification for the Study Area Extents
As defined by the regional Clodiagh River and the Multeen River catchments	The Clodiagh River is one of the regional catchments in which the UWF Related Works is located. The Clodiagh River catchment drains to the Lower River Suir SAC. Extending the scoping area beyond the Clodiagh River and Multeen River catchments would mean that a much larger proportion of the River Suir catchment would be included and therefore at this scale, the UWF Related Works would likely have a Neutral effect in relation to cumulative impacts to the SAC.

The study is illustrated on Figure CE 11.6.1: Lower River Suir SAC within the UWF Related Works Cumulative Evaluation Study Area.

11.6.2.1.2 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 11.6.2.2.1 below.

The 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 11-48 and illustrated on Figure WP 11.6: Lower River Suir SAC within the Cumulative Evaluation Study Area..

Table 11-48: Whole Project Cumulative Evaluation Study Area for Lower River Suir SAC

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	As defined by the regional Clodiagh River catchment	The Clodiagh River is one of the regional catchments in which the Whole Windfarm Project is located. The Clodiagh River catchment drains to the Lower River Suir SAC. Extending the scoping area beyond the Clodiagh River catchment would mean that a much larger proportion of the River Suir catchment would be included
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 5: UWF Other Activities		and therefore at this scale, the Whole Windfarm Project would likely have a Neutral effect in relation to cumulative impacts

11.6.2.2 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Lower River Suir SAC 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 Lower River Suir SAC 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 A2.3.2.11).

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 Lower River Suir SAC.

11.6.2.2.1 Potential for Impacts to Lower River Suir SAC

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 Lower River Suir SAC. The results of this evaluation are included in Table 11-49.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 11.6. The baseline character of the areas around these Elements is described in Section 11.6.2.3.

Table 11-49: 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: Neutral effect/No potential for effects due to: • The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no hydrological / water quality effects are likely. • Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore no surface water or groundwater impacts are expected. • Monitoring Activities do not require any major construction activities. Therefore, no surface water or groundwater impacts are expected. Once off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality.

	• During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore no water quality effects are expected.

11.6.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.6.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

Within the River Suir catchment, the last c.1.5km of the UWF Grid Connection 110kV UGC route is located within the Clodiagh River local surface water body. The UWF Grid Connection construction works are located c.11.5km upstream of the River Suir SAC.

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Clodiagh_010 local waterbody in the Suir catchment, where both 110kV UGC trenching works for UWF Grid Connection will be carried out.

11.6.2.3.2 Element 3: UWF Replacement Forestry

All of the UWF Replacement Forestry site is located within the River Suir catchment, in the Clodiagh River local surface water body. The UWF Replacement Forestry is located at least 12km upstream of the SAC.

11.6.2.3.3 Element 4: Upperchurch Windfarm

The majority of the Upperchurch Windfarm construction works areas are located within the River Suir catchment. The majority of the construction works areas within the River Suir catchment are located locally within the Clodiagh River catchment.

There is one watercourse crossings associated with the Upperchurch Windfarm, which is at least 12km upstream (Clodiagh River catchment) of the Lower River Suir SAC.

Consideration of the Passage of Time: The majority of the footprint of Upperchurch Windfarm will occur in the Clodiagh River regional catchment. There have been no changes to landuse or landcover, and no new sources of water pollution on the Upperchurch Windfarm site in recent years. In addition, there has been no material change in water quality in the Clodiagh River catchment (EPA WFD River Q Values 1971 – 2017) and therefore the baseline environment and the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

11.6.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 11.6.2.2.1.

11.6.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.6.2.1.

11.6.3 PROJECT DESIGN MEASURES for Lower River Suir SAC

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 11-50 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect **Lower River Suir SAC**.

Table 11-50: UWF Related Works Project Design Measures relevant to Lower River Suir SAC

PD ID	Project Design Environmental Protection Measure (PD)
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. Spoil excavations from public roads being transported to landfill will be covered during transport.
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.

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 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.

11.6.4 EVALUATION OF IMPACTS to Lower River Suir SAC

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) - Lower River Suir SAC.

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

Table 11-51: 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)*
Surface water quality impacts due to tree felling of conifer plantation. (construction stage)	*Excavation Dewatering (construction stage)*
Surface water quality impacts due to earthworks (excavations and overburden storage), (construction stage)	*Nutrient input due to tree felling (construction stage)*
Surface water quality impacts from watercourse crossing works, (construction stage)	*Increased Flood Risk (operational stage)*
Water quality impacts from fuels, oils and chemicals, (construction stage)	*Suspended Sediment Input (operational stage)*
Water quality impacts from cement-based compounds, (construction stage)	*Decommissioning Stage Effects*

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 11.6.4.1 to 11.6.4.5.**

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 11.6.4.6.

11.6.4.1 Impact Evaluation Table: Surface water quality impacts due to tree felling

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: None Cumulative Impact Source: Tree felling activities Impact Pathway: Runoff and surface water flowpaths Impact Description: Surface water quality impacts from sediment release in surface water runoff during coniferous felling operations within the River Suir Catchment. Tree felling within the River Suir catchment will only be required for UWF Related Works and the Upperchurch Windfarm Impact Quality: Negative	
Evaluation of the Subject Development Impact– Surface water quality impacts due to tree felling	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: In total, 0.3 hectares of forestry will be felled for the realigned windfarm roads and the Internal Windfarm Cable works, and all of this will be within the River Suir catchment. Surface water quality effects have the potential to occur locally, but impacts on the downstream SAC are likely to be Negligible due to the small felling area and the downstream distance to the SAC (>12km).	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • Relatively small felling area (0.3ha in total); • The total felling area relates to two separate locations (0.2ha and 0.1ha) with the works being completed one after the other, but not at the same time (**Project Design Measure**); • The two felling areas are at least 12km upstream of the Lower River Suir SAC; and, • This felling will be carried under a felling license from the Forest Service.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: The potential for cumulative effects due to forestry relates to the following local waterbodies: Owenbeg_10 and Clodiagh_010 local surface water bodies (both within the Clodiagh rver regional catchment). There is no potential for cumulative effects in the Multeen_10, as in-combination forestry felling will not occur in this catchment. Cumulative effects as a result of forestry felling only relates to UWF Related Works and Upperchurch Windfarm in these catchments – there is no forestry felling associated with either UWF Replacement Forestry or UWF Grid Connection. There is no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works. As felling areas are relatively small and located across two sub-catchments, the effects will be localised, and the overall magnitude of impact is considered to be negligible.	
Significance of the Cumulative Impact: Imperceptible	
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the River Suir SAC;	

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- The areas required for felling relating to the UWF Related Works (0.3ha) are small isolated areas that will be felled separately to the Upperchurch Windfarm felling (4.35ha), and therefore the potential for in-combination effects is negligible;
- The area to be felling for the UWF Related Works accounts for only 7% of the Upperchurch Windfarm felling area

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

Element 1: UWF Grid Connection

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- No tree felling required for the UWF Grid Connection within the River Suir catchment

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- No tree felling associated with the UWF Replacement Forestry

Element 4: Upperchurch Windfarm

Impact Magnitude:
A total of 4.35ha will be felled to facilitate the construction of the Upperchurch Windfarm infrastructure (2013 EIS). All of the felling will be undertaken in the River Suir catchment. No significant effects on the River Suir and its tributaries was the outcome of the assessment in the 2013 EIS.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The Sediment and Erosion Control Plan for the Upperchurch Windfarm has measures in place for control of sediment during tree felling, and therefore no significant effects are expected; and,
- All tree felling will be undertaken using good working practices as outlined by the Forest Service in their "Forestry Harvesting and Environment Guidelines (Forest Service, 2000a) and "Forestry and Water Quality Guidelines" (Forestry Service, 2000b).

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.6.2.2.1*

Evaluation of Other Cumulative Impacts – Surface water quality impacts due to tree felling

Whole UWF Project Effect

Cumulative Impact Magnitude:
Cumulative whole project effects relate to the UWF Related Works and the Upperchurch Windfarm. Due to the very small felling area associated with the UWF Related Works and the relatively small area of felling associated with Upperchurch, the in-combination magnitude of impacts is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC;

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• The areas required for felling relating to the UWF Related Works are small isolated areas that will be felled separate to the Upperchurch Windfarm felling, and therefore the potential for in-combination effects is negligible.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

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11.6.4.2 Impact Evaluation Table: Surface water quality impacts due to earthworks

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Earthworks and groundwork
Cumulative Impact Source: Earthworks and groundwork
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Surface water quality impacts from entrained sediment in surface water runoff arising during earthworks and groundwork associated with construction works within the River Suir catchment.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface water quality impacts due to earthworks

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
The majority of the works associated with UWF Related Works are located with the River Suir catchment. Of the total 17.9km of internal windfarm cabling, 16.2km is located within the River Suir catchment.
The potential for water quality effects will arising during earthworks required for the Internal Windfarm Cable trench (16.2km), temporary access roads (5.3km), Haul Route Works (refer to Table 11-9 and 11-10), Realigned Windfarm Raods and the Telecom Relay Pole works.

Up to 930m^3 of overburden will be permanently stored along the internal cabling route as linear berms and up to 10,850m^3 will be temporarily be stored for later reinstatement along the works area. Erosion of these storage areas potentially could result is surface water quality impacts locally.

Given the transient and distributed nature of the works within the local catchments over a large geographical area and the large downstream distance (>12km) to the SAC from the majority of the works areas, the impacts magnitude is considered to be **Negligible.**

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC;
- The majority of the watercourses intercepted by the works are drains (Class 4 watercourse) with low flows or no flows, and therefore the effectiveness of them acting as a surface water flowpath to the downstream SAC is limited;
- The vast majority of the works area (with the exception of watercourse crossings) are located more than 50m from a watercourse;
- All temporary and permanent overburden storage area will be located more than 50m from a Class 1 and Class 2 Watercourse;
- There is a significant overlap of works - approximately 62% of the Internal Windfarm Cabling will be installed within the consented UWF access roads, thereby reducing the need for additional excavations; and,
- The majority of the works areas are located at least 12km upstream of the Lower River Suir SAC.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Multeen (East)_10 and the Owenbeg_10 and Clodiagh_010 local surface water bodies (all within the River Suir catchment).

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Both UWF Related Works and Upperchurch Windfarm works will take place in the Multeen (East)_10 and Owenbeg_10 catchments, while UWF Related Works, Upperchurch Windfarm, UWF Replacement Forestry and UWF Grid Connection works will take place in the Clodiagh_010 catchment. There is no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works.

UWF Replacement Forestry will require negligible groundworks, and the potential for cumulatively impacts mainly relates to the groundworks and excavations associated with UWF Related Works, Upperchurch Windfarm and UWF Grid Connection.

In relation to storage of excavated materials (overburden), no storage is associated with UWF Grid Connection in the River Suir catchment as all excavations will be removed to landfill (all trailers will be covered to prevent escape of material, Project Design).

Cumulative overburden storage relates to UWF Related Works with Upperchurch Windfarm, where a total 4,3850m^3 of overburden which will be permanently stored and up to 5,5450m^3 will be temporarily stored for later reinstatement in the Suir regional catchment. It is possible that erosion of these storage areas could result in surface water quality impacts locally.

Due to the transient and spread out nature of the UWF Related Works, Upperchurch Windfarm and UWF Grid Connection and the fact that three-quarters of the local watercourses, are drains or marginal watercourses, the magnitude of impact is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, negligible magnitude combined with the Extremely High Importance of the SAC;
- While the majority of the UWF Related Works, the majority of Upperchurch Windfarm works, and all of the UWF Replacement Forestry, are located within the River Suir catchment, in-combination effects will be no greater than Slight to Moderate due to: the location of 62% of the Internal Windfarm Cabling within Consented UWF Roads which will reduce excavation requirements; the localised nature of effects from Haul Route Works and Realigned Windfarm Roads due to the scale of these works; imperceptible effects associated with UWF Replacement Forestry; and the implementation of the Sediment & Erosion Control Plan for the consented Upperchurch Windfarm;
- low or marginal ecological value of the majority of watercourses.
- Temporary nature of the works

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

Element 1: UWF Grid Connection

Impact Magnitude:
Only approximately 0.6km (of the total 28.9km), of the UWF Grid Connection, is located within the River Suir catchment and is at least 11.5km upstream of the SAC. UWF Grid Connection works within the Lower River Suir SAC are limited to trenching works, including the construction of c.1 to 2 Joint Bays, within public road pavements. Also, there are no temporary or permanent overburden storage areas required for the UWF Grid Connection within the River Suir catchment, as all excavations from the public road will be removed to landfill and therefore the potential for effects on the SAC is considered to be unlikely.

Significance of the Impact: No likely impacts

Rationale for Impact Evaluation:

- Due to the small scale of the works in the River Suir catchment and the large downstream distance to the SAC.
- No requirement to store UWF Grid Connection related excavations within the River Suir catchment.

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Element 3: UWF Replacement Forestry
Impact Magnitude: The potential surface water quality effects on local surface water bodies from sedimentation as a result of the replacement forestry works are considered to be negligible. This is due to the relatively small replanting area, and the fact that tree planting will be completed by hand. Therefore, there will be no requirement for rill ploughing or any earthworks, and the potential for the planting works to generate sediments in runoff is negligible. As such, nutrient loading to local watercourses is likely to be negligible.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC; • The small scale planting and the non-intrusive nature of the works.
Element 4: Upperchurch Windfarm
Impact Magnitude: Based on Chapter 15 (Hydrology Chapter) and the Sediment and Erosion and Control Plan from the 2013 EIS, release of sediment during the construction phase is likely to have a minor negative effect on the River Suir and its tributaries.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The upland nature of the site (remote from the main local streams and rivers) and the small number of drainage features within the site; and, • The measures outlined in the EIS and within the Sediment and Erosion and Control Plan will ensure the development of the wind farm will not have a significant impact on the surface water quality in the River and its tributaries.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.6.2.2.1*
Evaluation of Other Cumulative Impacts – Surface water quality impacts due to earthworks
Whole UWF Project Effect
Cumulative Impact Magnitude: Earthworks and storage/movement of excavated material will occur in the Clodiagh and Multeen regional catchments within the Lower River Suir SAC catchment area. The cumulative minor water quality effects, which are likely to be brief to temporary, are more likely to occur to the SAC within the Clodiagh River catchment, as the majority of the UWF Related Works and the Upperchurch Windfarm are within this catchment. Due to the transient and distributed nature of the construction works associated with both UWF Related Works and Upperchurch Windfarm and that the majority (62%) of the internal windfarm cabling will be located within the Upperchurch Windfarm (and therefore within the capture zone of the windfarm drainage), the impact magnitude on the SAC which is at least 11.5km downstream from works areas, the impact magnitude is considered to be **Negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC;

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- The majority of the 110kV UGC is contained within the River Shannon catchment and therefore its potential to contribute to in-combinations effects on the Lower River Suir SAC is less than negligible; works for UWF Grid Connection are located along the public road, with no requirement for overburden storage;
- The majority of the Upperchurch Windfarm and UWF Related Works, including all of the UWF Replacement Forestry, are located within the River Suir. However, as a large proportion (62%) of the Internal Windfarm Cabling is within Consented UWF Roads (i.e. reduced excavation requirements), the negligible effects of the UWF Replacement Forestry and that the effects of the Haul Route works and Realigned Windfarm Roads are likely to be localised, no significant in-combination effects are expected on the River Suir SAC which exists at least 11.5km downstream from Whole UWF Project works; and,
- The Sediment and Erosion Control Plan for the Upperchurch Windfarm has measures in place for controlling runoff during excavation work, and therefore no significant effects are expected on the Lower River Suir SAC.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

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11.6.4.3 Impact Evaluation Table: Surface water quality impacts from watercourse crossing works

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Watercourse Crossing Works
Cumulative Impact Source: Watercourse Crossing Works
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Indirect surface water quality impacts as a result of sediment release during stream crossing works such as open trenching for the 110kV UGC cabling and Internal Windfarm Cabling along with culvert emplacement / replacement within watercourses upstream of the SAC within the River Suir catchment.
Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface water quality impacts from watercourse crossing works

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
There are 31 no. (of 32 no.) watercourse crossings related to the UWF Related Works within the River Suir catchment. In-stream works will be required at 25 no. of these locations.
Given the fact that the majority (75%) of the crossing are drains (Class 4 Watercourse), the distributed and transient nature of the watercourse crossing works and that the SAC is at least 12km downstream of the majority of the crossing locations, the impact magnitude is considered to be **Negligible**.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC;

- 75% of the in-stream works areas are at drains (Class 4) or marginal watercourses (Class 3) which typically have no flows or very flows and therefore the effectiveness of them acting as a surface water flowpath to the downstream Lower River Suir SAC is limited;
- 26 no. of the total 31 no. watercourse crossings are located in the Clodiagh river catchment and are at least 11.5km upstream of the SAC with the remainder being at least 3km;
- Only between 1 and 2 watercourse crossings will be completed in any one day (2 construction crews will be working on Internal Windfarm Cabling works);
- No significant effects are anticipated on the local surface water bodies in the area of the works, therefore, no significant effects are anticipated on the further downstream SAC (refer to Section 11.2.4.5); and,
- The effects will be brief to temporary in nature and reversible.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to UWF Grid Connection. There may be up to 5 No instream works (small existing culverts on drains which may require replacement) required for UWF Grid Connection in the Clodiagh_010 in the Suir catchment, 22.no instream works are also required for UWF Related Works in this waterbody.

There is no potential for cumulative effects in relation to the 1 no. watercourse crossing which will be used by both UWF Related Works and the Upperchurch Windfarm, as this will involve the construction of a clear span bridge with no instream works. The Internal Cables will be installed in the bridge structure.

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There is no potential for UWF Replacement Forestry to cause cumulative effects with UWF Related Works as this project does not require instream works.

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Water quality effects, which are likely to be localised), will have a magnitude of impact negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- no instream works for Upperchurch Windfarm or UWF Replacement Forestry
- Small number of culverts (5) which may need replacing (and therefore instream works) for UWF Grid Connection in the Suir regional catchment.

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

Element 1: UWF Grid Connection

Impact Magnitude: Only Approximately 0.6km of the 110kV UGC is located within the River Suir catchment and only 2 no. drain crossings (Class 4 Watercourse) are required. Therefore no effects on the SAC are likely.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- The small scale of the works and the fact that the watercourses are only drains.

Element 3: UWF Replacement Forestry

Impact Magnitude:
There is no new watercourse crossing works required for the UWF Replacement Forestry, and therefore there will be no impacts.

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- There is no new watercourse crossing works required for the UWF Replacement Forestry, and therefore there will be no impacts.

Element 4: Upperchurch Windfarm

Impact Magnitude:
The water quality effects of stream crossing work with regard to the Upperchurch Windfarm were not assessed directly in 2013 EIS. However, the EIS concludes that overall water quality effects on the River Suir and its tributaries would not be significant. The potential impacts are further evaluated below for the purpose of assessing in-combination effects. Within the River Suir catchment, there will be a requirement for 1 no. watercourse crossing along the Upperchurch Windfarm access roads and in-stream works will not be required as a clear-span bridge is proposed.

Significance of the Impact: No Impact

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.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.6.2.2.1*

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Sensitive Aspect

Evaluation of Other Cumulative Impacts – Surface water quality impacts from watercourse crossing works
Whole UWF Project Effect
Cumulative Impact Magnitude: Watercourse crossings associated with the Whole UWF Project relate to UWF Grid Connection and UWF Related Works. Cumulatively both of these projects will require instream works in the River Suir catchment, where 5 no. existing culverts may potentially need to be replaced during UWF Grid Connection works, and instream works will also occur at 25 no. separate watercourse crossing points for UWF Related Works. There is no potential for cumulative effects in relation to the 1 no. watercourse crossing which will be used by both UWF Related Works and the Upperchurch Windfarm, as this will involve the construction of a clear span bridge with no instream works. The Internal Cables will be installed in the bridge structure. Therefore, there will be only be a requirement to carry out 31 no. watercourse crossing in total within the River Suir catchment. Therefore, the magnitude of impacts will be as per the UWF Related Works which is N**egligible**
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • With the exception of 1 No. clear span bridge, watercourse crossing within the River Suir are only associated with the UWF Related Works and the Upperchurch Windfarm; • Only 2 no. of the watercourse crossings associated with the 110kV UGC are located within the River Suir catchment; • The watercourses crossings required for the 110kV UGC, UWF Related Works and Upperchurch Windfarm will not be completed at the same and therefore the potential for significant in-combination effects are negligible; and, • The majority of the crossing locations are at least 11.5km upstream of the Lower River Suir SAC.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

Topic: **Water**

11.6.4.4 Impact Evaluation Table: Water quality impacts from fuels, oils and chemicals

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Fuel, oils and chemicals Cumulative Impact Source: Fuel, oils and chemicals Impact Pathway: Runoff and surface water flowpaths Impact Description: The plant and equipment that will be used during the construction phase will be run on fuels and oils. This creates the potential for spillage and leakage of hydrocarbons from plant during refuelling or storage of oils and fuels which can impact on downstream SAC. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Water quality impacts from fuels, oils and chemicals	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: Approximately 16.2km of the total 17.9km Internal Windfarm Cabling is located within the River Suir catchment including all of the Realigned Windfarm Road works and the majority of the Haul Route Works (see Table 11-9 and 11-10). Any spills or leaks of oils and fuels relating to the works are likely to be minor (worst case), isolated and occur rarely and therefore the magnitude of effects on the SAC are likely to be **Negligible**.	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • Only relatively small volumes of fuels / oils will be on-site at any one time and therefore no significant effects on local surface water bodies are expected; • The River Suir SAC is located more than 12km downstream from the majority of the works areas; and, • Any spills along the along the UWF Related Works areas are likely to be small isolated incidents and comprise very small amounts, and the actual residual volumes that might reach the downstream Lower River Suir SAC are likely to be negligible if any	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Multeen (East)_10 and the Owenbeg_10 and Clodiagh_010 local surface water bodies (all within the River Suir regional catchment). Effects from oil and fuel usage are likely to occur rarely and be isolated incidents. No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works. Given the distributed nature of the works within several local sub-catchments and the fact that only small volumes of fuel/oil will be present on-site at any one time, the in-combination magnitude of effect is considered to be negligible.	
Significance of the Cumulative Impact: Imperceptible	
Rationale for Cumulative Impact Evaluation: As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the local surface water bodies;	

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- the distributed nature of the works within several local sub-catchments and the fact that only small volumes of fuel/oil will be present on-site at any one time;
- A Fuel and Oil Management Plan is proposed for the Upperchurch Windfarm which will include storage requirements and emergency procedures for dealing with any spills and leaks;
- The additional volumes of oils and fuels that will be present on the Upperchurch Windfarm site as a result of the UWF Related Works will be negligible;
- The UWF Replacement Forestry is not likely to contribute to in-combination effects with respect to impacts from oils and fuels; and,
- Effects are likely to be due to small isolated localised spills (worst case) that are very unlikely to contribute to in-combination water quality effects within the local surface water catchments.

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

Element 1: UWF Grid Connection

Impact Magnitude:
Only 0.6km of the UWF Grid Connection is located within the River Suir catchment, where 110kV UGC works are located within the public road pavement, and no effects on the downstream SAC are likely due to the small scale, the downstream distance to the SAC (>11.5km), the transient nature of the works, and the small volumes of fuels/chemicals that will be present on-site.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- The small scale nature of the works, the small volumes of oils and fuels that will be present and the large downstream distance to the SAC.

Element 3: UWF Replacement Forestry

Impact Magnitude:
Plant and equipment used for the UWF Replacement Forestry works will be limited to 4 x 4 jeeps. Given the small scale nature of the works and the fact that no refuelling or storage of fuels will be undertaken on site, no impacts are expected.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- The small scale nature of the works, the small volumes of oils and fuels that will be present and the large downstream distance to the SAC.

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on the 2013 RFI Chapter 15 (Hydrology Chapter) the potential for water quality effects arises from the use and storage of oil and fuels. The overall effects were assessed to be not significant.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- A Fuel and Oil Management Plan will be implemented during the construction of the Upperchurch Windfarm which will outline storage requirements and emergency procedures for dealing with any spills and leaks.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.6.2.2.1*

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Evaluation of Other Cumulative Impacts – Water quality impacts from fuels, oils and chemicals
Whole UWF Project Effect
Cumulative Impact Magnitude: Machinery run on hydrocarbons, and use of fuels for the Whole UWF Project will be required for all Elements of the Whole UWF Project, which are all located to some extent within the catchment area of the Lower River Suir, and therefore there is potential for the Whole UWF Project to impact on the Lower River Suir SAC from oil and fuel usage. However, any effects are likely to occur rarely and be isolated incidents, and the magnitude of effects is likely to be **negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • Any spills and leaks that do occur (if any) are likely to be small isolated incidents and therefore the potential for cumulative effects is negligible; • A Fuel and Oil Management Plan will be implemented which will include storage requirements and emergency procedures for dealing with any spills and leaks; and, • The large downstream distance from the majority of the works area to the Lower River Suir which is at least 11.5km. • The location of the majority of the UWF Grid Connection outside of the River Suir catchment, therefore no impacts on the River Suir SAC are expected due to the negligible volumes of fuels and oils associated with UWF Grid Connection that will be present within the catchment.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

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11.6.4.5 Impact Evaluation Table: Water quality impacts from cement-based compounds

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Cement based compounds
Cumulative Impact Source: Cement based compounds
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment within the SAC.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Water quality impacts from cement-based compounds

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Limited to the Telecom Relay Pole foundation (c.4m3) and the 9 no. road crossings. Therefore, no impacts on surface water quality or the downstream SAC are anticipated.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:
- Small scale nature of the works and the downstream distance to SAC (<12km)

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: Other works involving cement in the River Suir catchment include concrete in the UWF Grid Connection 110kV UGC and for Consented UWF Turbine foundations and for the Consented UWF Substation, which could cause in-combination effects with the concrete used for the Telecom Relay Pole and at the 9 no. public road crossings of Internal Windfarm Cabling.

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Given the relatively small volumes of cement will be present on-site at any one time, the in-combination magnitude of effect is considered to be negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- The relatively small volumes of cement on-site at any one time with the potential to cause surface water quality impacts will be small;
- The use of concrete for the UWF Related Works is negligible, and impacts on surface water quality are not expected; and,
- Concrete Control Procedures will be included in the Environmental Management Plan for the Upperchurch Windfarm, and therefore no significant in-combination effects with respect to the UWF Related Works are expected.

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Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection
Impact Magnitude: Only 0.6km of the UWF Grid Connection is located within the River Suir catchment and any effects on the downstream SAC are likely to be less than negligible due to the small extent of works, the downstream distance to the SAC (>12km), the transient nature of the works, and the small volumes of cement (216m^3) that will be present on-site.
Significance of the Impact: No Impact
Rationale for Impact Evaluation: • The small scale nature of the works, the small volumes of cement that will be present and the large downstream distance to the SAC.
Element 3: UWF Replacement Forestry
Impact Magnitude: None
Significance of the Impact: No Potential for Impact
Rationale for Impact Evaluation: • No requirement to use cement at the UWF Replacement Forestry site
Element 4: Upperchurch Windfarm
Impact Magnitude: Based on Chapter 15 (Hydrology) of the 2013 EIS, there is a risk of spillage and runoff from cement during placing of concrete and also during washing out of chutes. The use of cement will mainly be for turbine base construction and the substation foundation. 20 no. turbines of the 22 no. permitted are located within the River Suir catchment and upstream of the SAC. However, the effects on the River Suir and its tributaries were assessed to be Not Significant.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • During pouring containment measures will be put in place to keep cement within the foundation area and prevent it entering the local drainage routes; and, • Washing of truck will be limited to the chutes, and a dedicated concrete washout area will be available on-site.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.6.2.2.1*
Evaluation of Other Cumulative Impacts – Water quality impacts from cement-based compounds
Whole UWF Project Effect
Cumulative Impact Magnitude: The use of cement based compounds within the catchment area of the Lower River Suir SAC mainly relates to Upperchurch Windfarm, with only very small volumes of concrete required for UWF Related Works or UWF Grid Connection in the catchment. Effects are not likely to occur, but there is potential for isolated incidents, which will be managed under the Upperchurch Windfarm Environmental Management Plan and the magnitude of effects is likely to be **negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • The majority of the UWF Grid Connection is located within the River Shannon catchment, and therefore no impacts on the River Suir SAC are expected;

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- The very small volumes of cement required for the UWF Related Works;
- The use of cement-based compounds within the River Suir catchment will comprises small volumes over a large geographical area within several local surface water bodies;
- The transient nature of the works over a 6 -8 month work period;
- The Upperchurch Windfarm will have measures in place to prevent release of cement into drainage routes during pouring of cement; and,
- Any spills that do occur are likely to be small isolated incidents and therefore the potential for cumulative effects is negligible.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

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11.6.4.6 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 the table below.

Table 11-52: Description and Rationale for Excluded Impacts to Lower River Suir SAC

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				
Excavation Dewatering (i.e. cable trench dewatering)	1,2,3,4	Runoff & SW Flowpaths	Excavation Dewatering	Rationale for Excluding: no likely impact No excavations required for the UWF Replacement Forestry, therefore no potential for impact. Based on trial pits undertaken at the windfarm site (which were found to be dry), no groundwater inflows into the cable trench for the UWF Grid Connection or Internal Windfarm Cabling are anticipated within the River Suir catchment. Therefore, surface water quality impacts, arising from dewatering of trenches, on the SAC is not expected.
Tree felling in Conifer Plantations Afforestation	2,3,4	SW Runoff	Nutrient input due to tree felling	Rationale for Excluding: Neutral Impact The surface water quality effects on local surface water bodies from sedimentation as a result of tree felling for t UWF Related Works or Upperchurch Windfarm were assessed to be Imperceptible to Slight (refer to Section 11.2.4.2). This is due to the relatively small felling areas and the fact that the felling areas are distributed between several local catchments. Therefore, as a result of this minor impact from sediment, the nutrient loading is assessed to be Neutral. The Upperchurch Windfarm will have a Sediment Control Plan, and therefore, the potential for nutrient loading to local watercourses is assessed to be Neutral as a result of the drainage design measures No tree felling/harvesting required for the UWF Replacement Forestry, therefore no potential for impact.
Operational Stage				
Runoff form Permanent hardstanding and flood risk from permanent watercourse crossing culverts	1,2,3,4	SW Flowpaths	Increased flood risk	Rationale for Excluding: Neutral Impact There are no new or upgraded watercourse crossings structures required for the UWF Replacement Forestry, therefore no potential for impacts. There are no watercourse crossing structures proposed within the SAC. All new permanent watercourse crossing structures for UWF Related Works are on small headwater watercourses which are upstream of the SAC. The 5 no. existing culverts which may need to be replaced for UWF Grid Connection are all on small drains. Effects on local surface water

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				bodies with respect to permanent crossings has being assessed to be imperceptible because culverts will be sized to cope with a 100-year flood flow as per the Project Design Measure (see Section 11.2.4.8) and therefore effects on the downstream SACs is considered to be Neutral. The effects of runoff on local surface water bodies was also assessed to be imperceptible due to the distributed nature of the permanent hardstanding infrastructure within several catchments over a large geographical area and the relatively small permanent footprint within individual local catchments (refer to Section 11.2.4.8). As such, effects on the downstream SACs will be Neutral.
Surface water quality impacts from runoff from permanent hardstanding surfaces	1,2,3,4	SW Flowpaths	Suspended solid input	Rationale for Excluding: Neutral Impact Due to the distributed nature of the permanent hardstanding infrastructure within several catchments over a large geographical area, the relatively small permanent footprint within individual local catchments and the fact that silt control measures will be included at all permanent hardstanding areas (Project Design Measure), the impact on local surface water bodies is considered to be imperceptible (see Section 11.2.4.9), therefore effects on the downstream SAC are considered to be Neutral. No groundworks or excavations required for the UWF Replacement Forestry, therefore no potential for impact.
Decommissioning Stage				
Rationale for Excluding: Neutral Impact, or no potential for impact to occur UWF Grid Connection will remain part of the National Grid. Therefore no hydrological impacts are expected. UWF Related Works: The cables will be pulled from the Internal Windfarm Cabling ducts at the turbines or at the substation; the ducting, Realigned Windfarm Roads and Haul Route Works will remain in-situ; therefore no decommissioning works to lands are required. The Telecom Relay Pole will be removed, and the compound area reinstated and returned to agricultural. Neutral effects to surface or groundwater are anticipated. The UWF Replacement Forestry will not be harvested or felled but will remain permanently in place. Therefore no hydrological impacts are expected. Upperchurch Windfarm: It is likely that the Consented UWF Substation will remain in-situ for use by ESBN and that the Consented UWF Roads will also remain in-situ for use by the landowner. Decommissioning works will be limited to the Consented UWF Turbines, Turbine Hardstanding areas, Meteorological Mast and associated drainage systems. All decommissioning works will take place from hard-core areas, with the majority of activity taking place on the turbine hardstands. Therefore, it is considered that decommissioning activities will have Neutral effects on surface water or groundwater.				

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11.6.5 Mitigation Measures for Impacts to Lower River Suir SAC

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 Lower River Suir SAC as a consequence of the UWF Related Works.

11.6.6 Evaluation of Residual Impacts to Lower River Suir SAC

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 Lower River Suir SAC above (Section 11.6.4) – i.e. **no significant adverse impacts**.

11.6.7 Application of Best Practice and the EMP for Lower River Suir SAC

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 **Lower River Suir SAC,** 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

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

11.6.7.1 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 UWF Related Works Environmental Management Plan, which accompanies this planning application as Volume D.

11.6.8 Summary of Impacts to the Lower River Suir SAC

A summary of the Impacts to the Lower River Suir SAC is presented in Table 11-53.

Table 11-53: Summary of Impacts to the Lower River Suir SAC

Impact to Lower River Suir SAC:	**Surface water quality impacts due to tree felling**	**Surface water quality impacts due to earthworks**	**Surface water quality impacts from watercourse crossing work**	**Water quality impacts from fuels, oils and chemicals**	**Water quality impacts from cement-based compounds**
Evaluation Impact Table	*Section 11.6.4.1*	*Section 11.6.4.2*	*Section 11.6.4.3*	*Section 11.6.4.4*	*Section 11.6.4.5*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction
UWF Related Works *Direct/indirect impacts*	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**	**No Impact**
UWF Related Works *Cumulative Impact*	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**
Element 1: UWF Grid Connection	No Impact	No likely impact	No Impact	No Impact	No impact
Element 3: UWF Replacement Forestry	No potential for impacts	Imperceptible	No potential for impacts	No Impact	No potential for impacts
Element 4: Upperchurch Windfarm	Not Significant	Not Significant	No Impact	Not Significant	Not Significant
Element 5: UWF Other Activities	No Potential for Impacts - Evaluated as Excluded, see Section 11.6.2.2.1				
Cumulative Impact:					
All Elements of the Whole UWF Project	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to 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 were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

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11.7 Sensitive Aspect No.6: Local Water Dependent Habitats

This Section provides a description and evaluation of the Sensitive Aspect - Local Water Dependent Habitats. In this EIA Report, Local Water Dependent Habitats relate to areas of wet grassland and wet heath which supports Devils Bit Scabious (plant) habitat for the Marsh Fritillary butterfly

11.7.1 BASELINE CHARACTERISTICS of Local Water Dependent Habitats

11.7.1.1 STUDY AREA for Local Water Dependent Habitats

The study area for Local Water Dependent Habitats in relation to the UWF Related Works is described in Table 11-54 and illustrated on Figure RW 11.7: Local Water Dependent Habitats within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 11-54: UWF Related Works Study Area for Local Water Dependent Habitats

Study Area for Local Water Dependent Habitats	Justification for the Study Area Extents
50m corridor, either side of works area as undertaken by the ecological surveys	Due to the shallow depth and temporary nature of the excavations associated with the construction works, the potential for impacts to local Water Dependent Habitats is limited to **localised** changes to surface water runoff/groundwater flow.

11.7.1.2 Baseline Context & Character of Local Water Dependent Habitats in UWF Related Works Study Area

In the UWF Related Works Study Area, Marsh Fritillary butterfly has been mapped in wet grassland and wet heath habitat, close to the Internal Windfarm Cabling at Section SW13/SW14. The Internal Windfarm Cabling will be installed within the Upperchurch Windfarm access roads at these locations. The habitats at the locations identified above are relatively small and fragmented. The wet grassland and wet heath habitat close to Internal Windfarm Cabling locations exists upslope of the construction works area, and therefore the natural drainage is unlikely to be impeded by the construction works.

11.7.1.3 Importance of Local Water Dependent Habitats

The wet grassland and wet heath habitat supports populations of Marsh Fritillary (Annex II) and therefore has high importance.

11.7.1.4 Sensitivity of Local Water Dependent Habitats

Wet grassland and wet heath habitats are sensitive to certain land use practices and specifically where drainage is being carried out.

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

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 (refer to Chapter 8 Biodiversity). Overall trends for some Annex quality habitats present within the receiving environment such as wet heath is included therein and evaluated nationally (stable in the case of Wet Heath for example).

11.7.1.6 Receiving Environment (the Baseline + Trends)

It is assumed that the habitats identified will be the receiving environment during the time of the development works.

11.7.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.7.2.1 Cumulative Evaluation Study Areas

11.7.2.1.1 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 Local Water Dependent Habitats	Justification for the Study Area Extents
50m corridor, either side of UWF Related Works construction works areas	Due to the shallow depth and temporary nature of the excavations associated with the construction works, the potential for impacts to local Water Dependent Habitats is limited to **localised** changes to surface water runoff/groundwater flow.

The study is illustrated on Figure CE 11.7 Local Water Dependent Habitats within the UWF Related Works Cumulative Evaluation Study Area.

11.7.2.1.2 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 11.7.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements which are described in Table 11-55 and illustrated on Figure WP 11.7: Local Water Dependent Habitats within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 11-55: Whole Project Cumulative Evaluation Study Area for Local Water Dependent Habitats

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	50m corridor, either side of Element works/ planting/ activity areas	Due to the shallow depth and temporary nature of the excavations associated with the construction works, the potential for impacts to local Water Dependent Habitats is limited to **localised** changes to surface water runoff/groundwater flow.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

11.7.2.2 Scoping of Other Elements & Other Projects and Scoping for Potential for Impacts

The evaluation of cumulative impacts to Local Water Dependent 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 Local Water Dependent 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 A2.3.2.11).

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 Local Water Dependant Habitats.

11.7.2.2.1 Potential for Impacts to Local Water Dependent 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 Local Water Dependent Habitats. The results of this evaluation are included in Table 11-56.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 11.7. The baseline character of the areas around these Elements is described in Section 11.7.2.3.

Table 11-56: 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 due to the absence of suitable marsh fritillary habitat on or adjacent to construction works areas.
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects due to the absence of suitable marsh fritillary habitat on or adjacent to the afforestation lands.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects to Local Water Dependent Habitats due to no requirement for construction excavation works and the absence of Marsh Fritillary habitat at activity locations.

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11.7.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.7.2.3.1 Element 1: UWF Grid Connection

Not applicable – Element evaluated as excluded. See Section 11.7.2.2.1.

11.7.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 11.7.2.2.1.

11.7.2.3.3 Element 4: Upperchurch Windfarm

The habitat described for UWF Related Works above is also relevant for the Upperchurch Windfarm.

11.7.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 11.7.2.2.1.

11.7.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.7.2.1.

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11.7.3 PROJECT DESIGN MEASURES for Local Water Dependent 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 11-57 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect **Local Water Dependent Habitats**.

Table 11-57: UWF Related Works Project Design Measures relevant to Local Water Dependent Habitats

PD ID	Project Design Environmental Protection Measure
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted

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.

11.7.4 EVALUATION OF IMPACTS to Local Water Dependent 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) - Local Water Dependent Habitats.

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

Table 11-58: 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)*
Drainage of water dependent habitat (construction/operational stage)	*No other impacts were excluded from the evaluation*

The source-pathway-receptor links for the impact included are described in the **Impact Evaluation Table, which is presented in the next section 11.7.4.1.**

Note: No other impacts were *excluded* from the evaluation.

11.7.4.1 Impact Evaluation Table: Drainage of Marsh Fritillary habitat

Impact Description	
Project Life Cycle Stage:	Construction / Operational Stage

Impact Source: Excavations and permanent infrastructure
Cumulative Impact Source: Excavations and permanent infrastructure
Impact Pathway: Surface water and groundwater flowpaths

Impact Description: Alteration of wet habitat drainage/hydrology within the works area as a result of temporary excavation works and permanent infrastructure and drainage.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Drainage of Marsh Fritillary habitat

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Wet Grassland / Wet Heath has been mapped along the Internal Windfarm Cabling at Section SW13/SW14 for 170m. The wet habitat mainly exists upslope of the works, and therefore effects are likely to be negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
- As per Table 11-7, **Negligible** magnitude combined with the **High** Importance of the habitat;
- The works at route Sections SW13/SW14 will only comprises a temporary trench and temporary access road, and therefore any minor effects will be temporary;
- The works are downslope of the wet habitat;
- The shallow and temporary nature of the cable trench;
- The cable will be installed within the permitted windfarm access road;
- All effects will be brief to temporary and reversible.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: As stated above the cable will be installed within the permitted windfarm access road within the Wet Grassland / Wet Heath at Section SW13/SW14 for 170m, and the potential for cumulative impacts is with Upperchurch Windfarm works. No Other Element or Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Given works that works only comprises a shallow temporary trench and temporary access road, which is downslope of the wet habitat, and the cable will be installed within the permitted windfarm access road and all effects will be brief to temporary and reversible, and the natural surface water / groundwater drainage regime in the area is to be maintained by the windfarm drainage, the magnitude of impact is considered to be **Small Adverse**.

Significance of the Impact: Slight

Rationale for Impact Evaluation:
- As per Table 11-7, **Negligible** magnitude combined with the **High** Importance of the habitat;
- The works at route Sections SW13/SW14 will only comprises a temporary trench and temporary access road, and therefore any minor effects will be temporary;
- The works are downslope of the wet habitat;
- The shallow and temporary nature of the cable trench;
- The cable will be installed within the permitted windfarm access road;
- All effects will be brief to temporary and reversible.

Local Water Dependent Habitats

Sensitive Aspect

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection – *N/A, evaluated as excluded, see Section 11.7.2.2.1*
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 11.7.2.2.1*
Element 4: Upperchurch Windfarm
Impact Magnitude: The Consented UWF Roads will be constructed through the same area of marsh fritillary habitat as the UWF Related Works above. The habitat is on both the upslope and downslope side of the works.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The works are upslope and downslope of the wet habitat; and, • The natural surface water / groundwater drainage regime in the area is to be maintained by the windfarm drainage.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 11.7.2.2.1*
Evaluation of Other Cumulative Impacts – Drainage of Marsh Fritillary habitat
Whole UWF Project Effect
Cumulative Impact Magnitude: There is potential for cumulative Impacts of the UWF Related Works and the Upperchurch Windfarm, where the Internal Windfarm Cabling at SW13/SW14 will be installed within the Consented UWF Roads, and therefore in-combination effects are likely to be **Small Adverse**. The natural surface water / groundwater drainage regime in the area is to be maintained by the windfarm drainage.
Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Small Adverse** magnitude combined with the **High** Importance of the habitat; • There is no potential for in-combination effects on the wet habitats due to the UWF Grid Connection; • The Internal Windfarm Cabling at SW13/SW14 will be installed within the Consented UWF access roads; • The consented windfarm drainage design will maintain the existing drainage regime.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Local Water Dependant Habitats with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.7.2.1).

Topic: **Water**

11.7.5 Mitigation Measures for Impacts to Local Water Dependent 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 Local Water Dependent Habitats as a consequence of the UWF Related Works.

11.7.6 Evaluation of Residual Impacts to Local Water Dependent 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 Local Water Dependent Habitats above (Section 11.7.4) – i.e. **no significant adverse impacts**.

11.7.7 Application of Best Practice and the EMP for Local Water Dependent Habitats

No specific Best Practice Measures have been developed for Local Water Dependant Habitats.

The Best Practice Measures and Surface Water Management Plan which will be implemented during the construction works for the protection of Local Surface Water Bodies (Section 11.2.7) and Local Groundwater Bodies (Section 11.3.7) will also provide protection to Local Water Dependent Habitats.

11.7.8 Summary of Impacts to Local Water Dependent Habitats

A summary of the Impacts to Local Water Dependent Habitats is presented in Table 11-59.

Table 11-59: Summary of the impacts on Local Water Dependent Habitats

Impact to Local Water Dependent Habitats:	**Drainage of Marsh Fritillary habitat**
Evaluation Impact Table	*Section 11.7.4.1*
Project Life-Cycle Stage	Construction/ Operation
UWF Related Works *Direct/indirect impact*	**Imperceptible**
UWF Related Works *Cumulative impact*	**Slight**
Element 1: UWF Grid Connection	No Potential for Impacts Evaluated as Excluded, see Section 11.7.2.2.1
Element 3: UWF Replacement Forestry	No Potential for Impacts Evaluated as Excluded, see Section 11.7.2.2.1
Element 4: Upperchurch Windfarm	Not Significant
Element 5: UWF Other Activities	No Potential for Impacts Evaluated as Excluded, see Section 11.7.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	**Slight**

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 were evaluated as having potential to cause cumulative effects to Local Water Dependent Habitats with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 11.7.2.1).

11.8 Policy Context

11.8.1 National Policy

The **EU Water Framework Directive (WFD) (2000/60/EC)** provides a legal framework for the protection of all waters and their dependent wildlife/habitat and to ensure its long-term, sustainable use. It is given effect by a number of regulatory instruments, including the following which are relevant to the subject development:

- European Communities (Water Policy) Regulations, 2003;
- The European Communities (Surface Waters) Regulations, 2009;
- The European Communities (Groundwater) Regulations, 2010;
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011; and,
- European Union (Water Policy) Regulations, 2014.

The Shannon and Suir River Basin Management Plans 2009 – 2015 set out how the objectives of the WFD would be reached. The plan establishes four core environmental objectives to be achieved generally by 2015:

- Prevent deterioration;
- Restore good status;
- Reduce chemical pollution;
- Achieve water related protected areas objectives; and,
- The 2nd cycle RBMPs 2015-2021 are currently being drafted.

11.8.2 Mid-West Regional Planning Guidelines 2010-2022

Section 6.3 of Water Services of the Mid-West Regional Planning Guidelines 2010-2022 does not contain specific guidance with regards to hydrology and hydrogeology but does refer to the following National Regulations and Policies:

- Water Framework Directive 2000/60/EC;
- Environmental Objectives (Surface Waters) Regulations 2009;
- Water Quality in Ireland 2007-2008;
- Key Indicators of the Aquatic Environment (EPA, 2009); and,
- Provision and Quality of Drinking Water in Ireland, a report for the Years 2007-2008 (EPA, 2009).

11.8.3 North Tipperary County Development Plan 2010 (as varied):

The following policies are defined in the North Tipperary County Development Plan 2010 - 2016 (as varied) in respect of water related impacts:

No.	Policy
LH6	Natura 2000 Sites and Protected Species It is the policy of the Council to ensure the protection, integrity and conservation of existing and candidate Natura 2000 sites and Annex I and II species listed in EU Directives. Where it is determined that a development may independently, or cumulatively, impact on the conservation values of Natura 2000 sites, the Council will require planning applications to be accompanied by a Natura Impact Statement in accordance with 'Appropriate Assessment of Plans and Projects, Guidelines for Planning Authorities', (DEHLG 2009) or any amendment thereof.
LH7	Natural Heritage Areas It is the policy of the Council to ensure the conservation and protection of existing and proposed NHAs, and to require that proposed developments within or in close proximity to an existing or proposed NHA would not have a significant adverse impact on the ecological status of the site.
LH8	Inland Waters and Riparian Zones It is the policy of the Council to protect the ecological status and quality of watercourses. In order to maintain the natural function of existing ecosystems associated with watercourses and their riparian zones and to encourage sustainable public access to waterbodies, the Council will require an undisturbed edge or buffer zone to be maintained, where appropriate, between new developments and riparian zones of water bodies.
LH12	Water Framework Directive and River Basin Management Plans It is the policy of the Council to protect and improve the county's water resources and support an integrated and collaborative approach to local catchment management in order to ensure the successful implementation of the River Basin Management Plans (or any review thereof).

11.9 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;

Best Practice Measures

- 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.

Topic **Water**

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);

Best Practice Measures

- Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
- Sediment laden water from trench dewatering will be discharged onto a well vegetated, flat, dry area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag. Silt fencing will be placed downslope of the outfall;
- If there is no suitable area for discharge onto ground, temporary settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Sediment laden water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
- Once the lean mix concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream work, the stream crossing will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required;
- If the watercourse crossing is to be used as a temporary crossing for construction machinery, double silt fencing and berms will be placed at the crossing to prevent sediment/runoff from the access road surface entering the watercourse;
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and watercourse sediments will be kept to the minimum required for the cable laying process to avoid unnecessary impact on the watercourse morphology;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refuelling allowed within 100m of the watercourse crossing;
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

Topic: **Water**

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;

Best Practice Measures

- There will be no refuelling allowed within 100m of the watercourse crossing; and,
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.

References

- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

Topic: **Water**

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;

Best Practice Measures

- If high levels of silt or other contaminants are noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface watercourses;
- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion;
- All temporary surface water control / protection measures such as silt fencing and check dams will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken;
- Where the cable trench route runs downslope for long distances (>50m) towards a watercourse, regular spaced impermeable bunds will be placed within the trench backfill to prevent the trench acting as a drain towards the stream thus preventing potential water quality impacts from surface water drainage within the trench;
- There will be no refuelling allowed within 100m of a watercourse; and,
- All plant will be checked for purpose of use prior to mobilisation.

References

- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.

Topic **Water**

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;

Best Practice Measures

- All accumulated silt will be removed from existing drains, culverts and silt traps. This removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall.

Post-felling surveys

- Post-felling surface water sampling will be undertaken at the main watercourse downstream of the works area (sampling will be completed during a wet period).

References

- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & Water Protection Guidelines;
- Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures; and,
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford.

Topic **Water**

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.

Best Practice Measures

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.

Topic: Water

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.

Best Practice Measures

References

- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006).
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.
- EMP for UWF Related Works, Section 6: Environmental Emergency Procedure for Oil/Fuel Spillage

Topic **Water**

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.

Best Practice Measures

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.

Topic: **Water**

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.

11.10 Summary of the Water Chapter

UWF Related Works is mainly located within the River Suir (surface water) and Templemore A (groundwater) catchments, with the remainder of the project is located within the River Shannon (surface water) and Slieve Phelim (groundwater) catchments.

The construction of the UWF Related Works will involve crossing over 32 watercourses, and will include the construction of 9 new permanent crossing structures all of which are located within the catchment area for the Lower River Suir SAC.

The sensitive aspects of Water evaluated in this topic chapter include: Local Surface Water Bodies, Local Groundwater Bodies, Local Wells & Springs, Lower River Shannon SAC, Lower River Suir SAC and Local Water Dependent Habitats.

A suite of environmental protection measures (18 no.) has been integrated into the project design to ensure that significant effects to the Water environment are avoided or reduced. In addition to the Project Design Measures, 11 Best Practice Measures 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 which will provide the framework for water quality protection at the site.

11.10.1 Summary of UWF Related Works Impacts

The likely adverse impacts to the individual Sensitive Aspects are outlined below:

- Adverse Impacts to Local Surface Water Bodies, as a consequence of the UWF Related Works, ranged from Imperceptible to Slight-Moderate,
- Adverse Impacts to Local Groundwater Bodies, Lower River Shannon SAC, Lower River Suir SAC or Local Water Dependent Habitats will be of no greater significance than Imperceptible,
- Impacts to Local Wells & Springs are not likely to occur.

11.10.2 Summary of UWF Related Works Cumulative Impacts

- Adverse cumulative impacts to Local Surface Water Bodies will be no greater than for UWF Related Works on its own.
- Adverse cumulative Impacts to Local Groundwater Bodies, Lower River Shannon SAC, Lower River Suir SAC or Local Water Dependent Habitats will be of no greater significance than Imperceptible to Slight,
- Cumulative impacts to Local Wells & Springs are not likely to occur.

11.10.3 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 (in particular UWF Grid Connection, Upperchurch Windfarm and UWF Replacement Forestry).

- In-combination impacts to Local Surface Water Bodies, ranged from Imperceptible to Slight-Moderate with the Other Elements of the Whole UWF Project.
- Cumulative Impacts to Local Groundwater Bodies, Lower River Shannon SAC or Lower River Suir SAC will be of no greater significance than Imperceptible,
- Cumulative Impacts of UWF Related Works with Upperchurch Windfarm to Local Water Dependent Habitats will be Slight.

11.10.4 Summary of Cumulative Impacts with Other Projects or Activities

The cumulative impact with Other Projects or Activities relates to the in-combination effect of UWF Grid Connection, and to a lesser extent UWF Related Works and Upperchurch Windfarm, with Bunkimalta Windfarm which is a consented project and could be constructed during the same period as these Whole UWF Project Elements.

- There is no potential for UWF Related Works to contribute to cumulative impacts to Local Surface Water Bodies. Cumulative impacts of the Other Elements of the Whole UWF Project only relates to UWF Grid Connection, which together with Bunkimalta Windfarm could cause Slight adverse impacts to Local Surface Water Bodies (in particular the Clare River and Newport (Mulkear) River catchments).
- Cumulative impacts of the Whole UWF Project Elements (UWF Related Works, UWF Grid Connection and Upperchurch Windfarm), with Bunkimalta Windfarm, to the Lower River Shannon SAC will remain cumulatively Imperceptible.
- There is no potential for cumulative impacts of any Element of the Whole UWF Project with Other Projects or Activities to Local Groundwater Bodies, Local Wells & Springs, Lower River Suir SAC or Local Water Dependent Habitats.

The authors conclude that **no significant adverse effects to Water are likely to occur** as a result of the development of the UWF Related Works, either alone or in combination with Other Elements of the Whole UWF Project or Other Projects or Activities.

11.11 Reference List

ESB International (2013): Bunkimalta Windfarm Co. Tipperary - Environmental Impact Statement.

An Bord Pleanála (2013) Inspectors Report for Bunkimalta Wind Energy Project PL22.241924

Environmental Protection Agency (2009): Code of Practice - Wastewater Treatment and Disposal Systems

Geological Survey of Ireland (2004) Bedrock Geology 1:100,000 scale map series, Sheet 18 (Geology of Tipperary).

Geological Survey of Ireland (various) Groundwater Body Characterisation Reports.

Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements.

Ecopower Developments Ltd. (2013) Upperchurch Windfarm Environmental Impact Statement 13510003

Ecopower Developments Ltd. (2013) Upperchurch Windfarm Response to Further Information 13510003

An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040

An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040

Malachy Walsh and Partners (2012): Windfarm Development Upperchurch, Thurles, Co. Tipperary - Geotechnical Assessment Report.

National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

National Parks and Wildlife Services (2004): Bleanbeg Bog NHA Site Synopsis Report (002450).

National Parks and Wildlife Services (2013): Lower River Shannon SAC Site Synopsis Report (002165).

National Parks and Wildlife Services (2013): Lower River Suir SAC Site Synopsis Report (002137).

Tipperary County Council (December 2017 Edition): North Tipperary County Development Plan 2010 – 2016 (As Varied).

EPA River Q Values 1971 to 2017, accessed January 2019: https://gis.epa.ie/EPAMaps/

UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 12: Air

Topic Chapter Authors:

awnconsulting

Compliance Engineering Ireland Ltd.
Test & Certification Solutions

Malachy Walsh and Partners
Engineering and Environmental Consultants

EIAR Coordinator:

ECOPOWER

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Topic Air

Contents

List of Figures

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

List of Appendices

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

List of Abbreviations

Abbreviation	Full Term
AIMD	Active Implantable Medical Devices, such as Pacemakers
BPM	Ecopower Best Practice Measure developed by members of the EIAR Team
dB	Decibel - The unit of sound pressure level
EMF	Electromagnetic Fields, Comprising of Electric and Magnetic Field.
HDV	Heavy Duty Vehicle with a gross weight greater than 3.5 tonnes
IAQM	Institute of Air Quality Management
ICNIRP	International Commission on Non-Ionising Radiation Protection
NHA	National Heritage Area
OHL	Overhead Power Line, mounted on wooden poles or pylons
PD	Ecopower Project Design Environmental Protection Measure
PM	Abbreviation for particulate matter suspended in the air. PM10 is airborne particulate matter with an aerodynamic diameter less than 10 microns (µm); PM2.5 is less than 2.5µm
SAC	Special Area of Conservation

Abbreviation	Full Term
SPA	Special Protection Area
TII	Transport Infrastructure Ireland
V/m, or kV/m	Electric Field is measured in Volts per metre, V/m, or kV/m (1000 V/m)
µT	Magnetic Field is measured in micro Tesla , µT
UGC	Underground Cable
UWF	Upperchurch Windfarm

Glossary of Terms

Term	Definition
Ambient Sound	The total amount of all noise present at a particular place and time in the environment at the point of investigation
Attenuation	The reduction of sound energy by a variety of means such as air, humidity, porous materials, distance etc.
Average Noise Level (LAeq, Leq)	This is the energy average noise level considered as a notional steady level that contains the same amount of noise as the actual fluctuating noise level during a specified period of time (based on equal energy principal) expressed as LAeq sometimes as Leq
Decibel or dB	The unit of sound pressure level usually abbreviated to the dB. Any noise quantity that is expressed as a level is measured and quoted in decibels
EMF Immunity	The robustness of an electrical/electronic device to EMF interference and maintain correct operation.
Equipment Interference	Electrical/electronic device failing to maintain correct operation due to EMF levels
Noise Level	For sound transmitted primarily through the air it is usually taken to be the A weighted sound pressure level
Maximum Noise Level	This is the highest instantaneous sound pressure level in decibels with a specified frequency weighting and time weighting, expressed as LAFMax and sometimes referred to as the LMax
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Substation	Part of the Electrical Grid system, transform Voltage to higher or lower and perform several other functions
Trackout	The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site
V/m, or kV/m	Electric Field is measured in Volts per metre, V/m, or kV/m (1000 V/m)
µT	Magnetic Field is measured in micro Tesla , µT

Topic Air

12 Environmental Factor: Air

12.1 Introduction to the Air Chapter

12.1.1 What is Air?

In this EIAR, Air relates to air quality, ambient noise and vibration and electromagnetic Fields.

Air quality relate to the quality of air in our environment, and can be adversely affected by emissions of various pollutants. In terms of this chapter, nitrogen oxides (NO + NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) are the two main air pollutants of concern. Poor air quality can impact human health, vegetation and ecosystems. Ireland in general has a good standard of air quality compared with other European countries.

Airborne noise is energy propagated through the air via pressure fluctuations which are detected by the ear. Vibration relates to energy propagated through either the air or the ground.

Electromagnetic Fields (EMF) comprise an electric field and a magnetic field, and are emitted from both natural and unnatural sources in the environment. All sources of EMF below 300 GHz in the electromagnetic spectrum (such as the subject development) are considered Non-Ionizing Radiation, which means the EMF does not carry enough energy to remove an electron from its atomic structure.

12.1.2 Overview of Air in the Local Environment

In general terms the project is located in predominantly rural areas and away from major urban areas or centres of population. The surrounding landscape is predominantly rural, agricultural grassland and forestry. Nearby villages include Upperchurch and Kilcommon. The area is sparsely populated with individual dwellings and farmsteads scattered throughout this rural area.

There are waymarked trails in the area – the Eamonn a Chnoic Loop Walk and the Ormond Way walk and cycle routes.

There is a high level of air quality in this upland area, as it is located away from busy, congested roads and industrial sources of air pollutants.

The existing noise sources are typical for such a rural/ agricultural setting, dominated by natural noise sources, mainly wind borne noise, but also running water and birdsong. There are also man-made noise sources in rural areas including farm machinery when in operation, and traffic on the local road network.

Sources of EMF in the existing environment include electric equipment, and low, medium and high voltage overhead electricity lines, overhead telephone lines, signals from existing telecommunications masts and underground communication cables which run along road boundaries and across agricultural lands. There is a mobile operator mast, with point to point microwave links and a GSM sector panel, in Knockmaroe townland (Foilnaman Mast).

The location of the UWF Related Works is illustrated on OSI Mapping on Figure RW 12.1: Location of the UWF Related Works.

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

12.1.3 Sensitive Aspects of the Air 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	Local Residents & Community	Section 12.2
Sensitive Aspect No. 2	Transient People	Section 12.3

Each of the above listed Sensitive Aspects are evaluated individually in Sections 12.2 to 12.3 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 12.2 to 12.3. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

12.1.4 Sensitive Aspects excluded from further evaluation

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

Telecommunications Infrastructure *(Telecommunication equipment on local masts and local signal paths between tele-communication masts)*	Evaluated as excluded in this Air chapter: Evaluated in Chapter 14: Material Assets (Built Services). The levels of EMF associated with the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm and the potential effects of EMF on the local communication networks have been a subject of discussion between Kevin Hayes of Ai Bridges, one of the authors of Ch.14 Material Assets (Built Services) and Lewis Brien, one of the authors of this topic chapter Air. During these discussions, it was decided that in order to avoid duplication of information in this EIA Report, that the potential for EMF to affect the local underground and overhead communication infrastructure would be evaluated in Chapter 14: Material Assets (Built Services).
Sensitive Ecological Receptors *The following Biodiversity receptors may be sensitive to dust soiling or nitrogen deposition; general birds and mammals, bats, bryophytes and aquatic vegetation/ macroinvertebrates.* *Aquatic Species and invertebrates could be sensitive to noise and vibration effects.*	Evaluated as excluded in this Air chapter: Evaluated in Chapter 8: Biodiversity. To avoid duplication of information in this EIA Report, the impact on sensitive ecological receptors is dealt with in detail in Chapter 8: Biodiversity. Information was provided by the authors of this chapter Air to the authors of the Biodiversity Chapter relating to dust, nitrogen deposition, noise and vibration impacts. The assessment of these impacts on sensitive ecological receptors was then carried out by the authors of Chapter 8: Biodiversity.

12.1.5 Overview of the Subject Development

The UWF Related Works are the subject development, being the subject of this appeal to An Bord Pleanála. The main parts of the UWF Related Works are identified in Table 12-1 below.

Table 12-1: 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.

12.1.6 The Authors of the Air Chapter

This report on the Environmental Factor Air, was written by a number of authors.

The Air Quality sections have been written by Ciara Nolan, BSc (Hons) in Energy Systems Engineering and Master in Applied Environmental Science, of AWN Consulting Ltd. She is an Associate Member of the Institute of Air Quality Management and specialises in the fields of ambient and indoor air quality monitoring and EIA. AWN Consulting is a multidisciplinary environmental consultancy specialising in Acoustics, Air Quality, Climate, Waste, Water and Soil Quality, Flora and Fauna and Seveso II Major Accident Hazard Land Use Assessments.

The Noise and Vibration sections have been written by Peter Barry (BAgr Sc, MSc), environmental scientist and environmental impact assessment practitioner of Malachy Walsh & Partners (MWP), Consulting Engineers. Peter has 15 years' experience across a variety of environmental topics and has particular expertise in the measurement, assessment, prediction and control of environmental noise and is a member of the Institute of Acoustics and the Institute of Environmental Management and Assessment.

The Electromagnetic Fields sections have been written by John McAuley (MSc (Hons) in Engineering), Lewis Brien (B (Hons) in Electronics) and Nigel Duignan (MSc (Hons) in Electronics) of Compliance Engineering Ireland (CEI). CEI has carried out over 500 radiofrequency site surveys throughout Ireland and worldwide and is recognised by Comreg as one of the foremost independent authorities on the radio frequency spectrum in Ireland.

12.1.7 Sources of Baseline Information

The information sources outlined in Table 12-2 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 12-2: Sources of Baseline Information for Air

Type	Source
Consultation	Feedback was received from • Health Service Executive • Members of the public during the Public Consultation and Information Day See Chapter 3: The Scoping Consultations, and Chapter 3 Appendices
Industry Guidance	• Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII, 2011) • Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014) • Environmental Protection Agency – Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), 2016. • NRA Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004) • Transport Infrastructure Ireland "Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, March 2014" • Institute of Environmental Management and Assessment (IEMA) - Guidelines for Environmental Noise Impact Assessment, 2014. • British Standard 5228 Parts 1 & 2, Code of Practice for Noise and Vibration Control on Construction and Open Sites + A1 2014. • ISO 9613-2-1996- Acoustics – Attenuation of sound during propagation outdoors –Part 2: General method of calculation, • ICNIRP Guidelines For Limiting Exposure To Time-Varying Electric And Magnetic Fields (1Hz – 100 kHz) (2010) • EU EMF recommendation 1999/519/EC. • European Committee for Electrotechnical Standardization (CENELEC), "EN 45502-2-1:2003 Active implantable medical devices. Particular requirements for active implantable medical devices intended to treat bradyarrhythmia (cardiac pacemakers) • European Commission (EC) "Electromagnetic Compatibility Directive 2014/30/EU" • European Commission (EC) "Radio and Telecommunications Equipment Directive 1999/5/EC" • S. I. No. 109 of 2007, European Communities (Electromagnetic Compatibility) Regulations 2007. • S. I. No. 240 of 2001, European Communities (Radio and Telecommunications Terminal Equipment) Regulations 2001.
Desktop	• EPA "Air Quality Monitoring Report 2015" (EPA, 2016), • EPA Annual Air Quality Monitoring Reports (1997 – 2014) • Review of aerial photography, and OSI and other online mapping to identify local residential properties, local community facilities and walking routes and to identify other activities in close proximity to these properties and routes • Review of aerial photography and OSI Mapping and property locations

Type	Source
	• AC Field Modelling of the fields from the works • Comreg, ESB and Radiological Protection Institute of Ireland online Information • Chapter 10: Soils • Chapter 15: Material Assets - Roads • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Environmental Impact Statement 13510003 • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Response to Further Information 13510003 • An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 • An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040
Fieldwork	• Site visits to establish the proximity of nearby sensitive receptors to the works areas. • Representative noise measurement undertaken at a similar substation to the Mountphilips Substation for the purposes of the evaluation. • Baseline Noise Measurements at the nearest noise sensitive receptor to the Mountphilips substation location

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

12.1.7.1 Certainty and Sufficiency of Information Provided

The information used to compile the Air Quality sections of this chapter is collated from reports and documents generated by local authorities and statutory agencies, including the Environmental Protection Agency, Transport Infrastructure Ireland, The UK Institute of Air Quality Management and The UK Department for Environment, Food and Rural Affairs. The most recent publications have been relied upon, with references detailed as footnotes throughout the chapter.

The information used to compile the Noise and Vibration sections of this chapter is based on the detailed project description provided by the project developer and empirical data gathered by the chapter author. The empirical data includes field measurements and observations in addition to data contained in internationally recognised and industry standard guidelines and best practice documents. Where assumptions have been made, professional judgement has been used based on many years' experience. The source of all data and information is clearly referenced within this document. Sufficient information was available for the purposes of this assessment.

The information used to compile the Electromagnetic Fields sections of this chapter is collated from reports and documents generated by national and international authorities and statutory agencies, including the Commission for Communication Regulation (Comreg), International Commission for Non-Ionizing Radiation Protection (ICNIRP), Health and Safety Authority (HSA), Eirgrid in Ireland, National Grid in the United Kingdom and a selection of published and accessible scientific studies. Where possible the most recent publications are relied upon, with references detailed as footnotes throughout the chapter.

12.1.8 Methodology for Evaluating Effects to Air Quality

The Elements of the Whole UWF Project can impact local air quality through two mechanisms: traffic based air pollutants and construction dust emissions. The study area extent and receptor sensitivity vary somewhat under each mechanism.

The methodology for evaluating noise, vibration and EMF effects is provided in Sections 12.1.9 and 12.1.10.

12.1.8.1 Air Quality Standards

Air quality is evaluated against Air Quality Standards set out by the EU. Air Quality Standards were established under EU Directive 2008/50/EC which sets limit values for certain air pollutants in order to protect against human health and ecological impacts. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors, such as natural background levels, environmental conditions and socio-economic factors, may be considered. The limit values are presented in Table 12-3 below.

Table 12-3: EU Air Quality Standards Regulations

Pollutant	Regulation[1]	Limit Type	Value
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
$PM_{2.5}$	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3 NO_2
		Annual limit for protection of human health	40 µg/m^3 NO_2
		Critical Load for protection of vegetation	30 µg/m^3 NO + NO_2

12.1.8.2 Transport Infrastructure Ireland Guidance on Traffic based air pollutants

The UK DMRB guidance, on which Transport Infrastructure Ireland (TII) guidance document '*Guidelines on the Treatment of Air Quality During the Planning and Construction of National Road Schemes*' was based, states that road links[2] meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment.

Neither the subject development nor the whole project meet any of the criteria listed in Table 12-4, and as a result a local air quality assessment was not required.

Table 12-4: UK DMRB Criteria for Air Quality Assessment

TII Criteria	Criteria met?
Road alignment change of 5 meters or more	No, no change in road alignments
Daily traffic flow changes by 1,000 AADT or more	No, daily traffic substantially below 1000 AADT
HGVs flows change by 200 vehicles per day or more	No, HGV flows substantially below 200 vehicles/day
Daily average speed changes by 10 km/h or more	No, no change in average speed
Peak hour speed changes by 20 km/h or more	No, no change in peak hour speed

[1] Based on EU Directive 2008/50/EC
[2] A road link is where the existing road network is broken up into sections of road with similar traffic conditions (traffic composition, speed and flow).

12.1.8.2.1 TII Guidance on Biodiversity

With regard to ecological impacts as a result of nitrogen deposition from increased traffic volumes, TII state that designated habitats within 2 km of the study corridor should be identified in consultation with the project Ecologist. Where substantial changes occur in traffic flows (increase of 5% or greater), detailed consideration should be given to all designated sensitive sites that are within 200 m of any road and that could be affected by the proposed scheme.

It should be noted that Biodiversity effects are evaluated in Chapter 8: Biodiversity.

12.1.8.3 IAQM Guidance on Construction Dust Emissions

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' outlines an assessment method for predicting the impact of dust emissions from earthworks, construction and haulage activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase in order to predict the likely magnitude of the dust impacts on sensitive receptors.

12.1.8.3.1 IAQM Guidance on identifying Sensitive Receptors

The IAQM Guidance states that an assessment of dust impacts will be required where there is a 'human receptor' within 350 m of the boundary of the works or within 50 m of routes used by construction vehicles.

According to the IAQM Guidance **a 'human receptor'** refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling[3], or exposure to PM_{10} over a time period relevant to the air quality objectives.

In relation to ecological receptors, IAQM state that 'ecological receptors are habitats that might be sensitive to dust'. Dust from construction and demolition activities deposited on vegetation can create a stress within the plant community. During dry periods dust has a tendency to stick to and coat vegetation causing a smothering effect which can lead to a reduction in photosynthesis, transpiration and respiration. However, plant communities affected by short-term works are likely to recover within a year of works ceasing.

The criteria for determining the sensitivity of a receptor to effects from dust is outlined in Table 12-5 below.

[3] As Per IAQM guidance 2014: Occupational settings are relevant in terms of annoyance effects.

Table 12-5: IAQM Criteria for determining the sensitivity of a receptor to dust impacts

Sensitivity of a Human Receptor to Dust soiling	
High	locations where users can expect enjoyment of a high level of amenity
	appearance, aesthetics, value of property diminished by soiling
	people or property present either continuously or for extended periods of time
Medium	locations where users expect to enjoy a reasonable level of amenity
	appearance, aesthetics, value of property diminished by soiling
	people or property not present continuously or regularly for extended periods of time
Low	locations where enjoyment of amenity is not reasonably expected
	property not expected to be diminished in appearance, aesthetics, value by soiling
	areas of transient exposure where people or property are passing through or by an area
Sensitivity of a Human Receptor to health impacts from PM_{10}	
High	areas where people are exposed over a time period relevant to the air quality objective for PM_{10} (Air Quality Standards established under Directive 2008/50/EC are reproduced in Table 12-2 of Appendix 12.1: Air Quality Monitoring & Standards.)
Medium	locations where the people exposed are workers
Low	locations where human exposure is transient
Sensitivity of an ecological receptor to Dust Soiling	
High	locations with a national/international designation ***and*** the designated features may be affected by dust soiling
	locations where there is a community of dust sensitive species
Medium	locations with an important plant species whose dust sensitivity is unknown
	locations with national designation where the features may be affected by dust deposition
Low	locations with local designation where features may be affected by dust deposition

12.1.8.3.2 IAQM Guidance on Evaluating the Sensitivity of the Area

According to IAQM Guidance (2014), the sensitivity of an area to construction dust impacts from either dust soiling or health impacts from PM_{10} is assessed using the criteria outlined in Table 12-6 to Table 12-7. This is based on the sensitivity of the receptor, the number of receptors and their distance from the dust source.

With regards to the sensitivity of the area a 'worst-case' approach has been taken in this assessment whereby the area with the majority of sensitive receptors within the closest distance to any works area or haulage routes have been assessed. This will establish the highest possible level of risk associated with any element of the project for either dust soiling or health impacts from PM_{10}; then the appropriate level of mitigation or best practice measures can be established if necessary, based on a high, medium or low level of risk.

Table 12-6: Sensitivity of an area to dust soiling effects on people and property (in bold)

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		less than 20	less than 50	less than 100	less than 350
High	greater than 100	**High**	**High**	**Medium**	**Low**
	10 - 100	**High**	**Medium**	**Low**	**Low**
	1 - 10	**Medium**	**Low**	**Low**	**Low**
Medium	1 or more	**Medium**	**Low**	**Low**	**Low**
Low	1 or more	**Low**	**Low**	**Low**	**Low**

(Note: The sensitivity of the area to dust soils effects are identified in bold text)

Table 12-7: Sensitivity of an area to human health impacts

Receptor Sensitivity	Annual Mean PM_{10} concentration	Number of Recep-tors	Distance from the Source (m)				
			less than 20	less than 50	less than 100	less than 200	less than 350
High	less than 24 µg/m^3	greater than 100	**Medium**	**Low**	**Low**	**Low**	**Low**
		10 - 100	**Low**	**Low**	**Low**	**Low**	**Low**
		1 - 10	**Low**	**Low**	**Low**	**Low**	**Low**
Medium	less than 24 µg/m^3	greater than 10	**Low**	**Low**	**Low**	**Low**	**Low**
		1 - 10	**Low**	**Low**	**Low**	**Low**	**Low**
Low	less than 24 µg/m^3	1 or more	**Low**	**Low**	**Low**	**Low**	**Low**

(Note: The sensitivity of the area to dust soils effects are identified in bold text)

Table 12-8: Sensitivity of an area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	less than 20	less than 50
High	**High**	**Medium**
Medium	**Medium**	**Low**
Low	**Low**	**Low**

(Note: The sensitivity of the area to dust soils effects are identified in bold text)

12.1.8.3.3 IAQM Guidance on Evaluating the Magnitude of Dust Emissions

Earthworks will primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total site area > 10,000 m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;
- **Medium:** Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8 m in height, total material moved 20,000 – 100,000 tonnes;
- **Small:** Total site area < 2,500 m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

The dust emission magnitude for the earthwork activities can be classified as **large** as worst case.

Construction: Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;
- **Medium:** Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- **Small:** Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude for the construction activities associated with the Whole UWF Project can be classified as **medium** as worst case

Trackout: In relation to trackout, factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** > 50 HDV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;
- **Medium:** 10 - 50 HDV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m;
- **Small:** < 10 HDV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

The dust emission magnitude for the trackout can be classified as **medium** as a worst-case.

12.1.8.3.4 IAQM Guidance on Evaluating the Risk of Dust Impacts

The sensitivity of the area is combined with the dust emission magnitude to define the risk of dust impacts in the absence of mitigation, as outlined in Table 12-9.

Table 12-9: Risk of Dust Impacts in relation to earthworks, construction works and trackout

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk – earthworks/construction *or* Low Risk - trackout	Low Risk – earthworks/construction *or* Negligible - trackout
Low	Low Risk	Low Risk	Negligible

12.1.9 Methodology for Evaluating Noise & Vibration Effects

12.1.9.1 NRA Guidelines on Construction Noise

There is no statutory guidance in Ireland relating to the maximum noise levels permitted during construction works, and in the absence of statutory guidance or other specific limits prescribed by local authorities, the thresholds outlined in Table 1 of the NRA *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (2004) has been adopted in this appraisal. The Authority (NRA) considered that the noise levels, included in Table 12-10 below, are typically deemed acceptable, with the comment that more stringent levels might be appropriate in areas where pre-existing noise levels are low.

Table 12-10: Construction Stage Noise Level Thresholds at the façade of dwellings

Period	Working Hours	$LAeq_{(1\ hour)}$ dB[4]	$LpA_{(Max)slow}$[5] dB
Monday to Friday	07:00 to 19:00hrs	70	80
Monday to Friday	19.00 to 22.00hrs[6]	60*	65*
Saturday	08:00 to 16:30hrs	65	75

The results of background noise monitoring at Mountphilips (see Appendix 12.2 Noise Modelling & Background Noise Measurement) show that when averaged for each of the day, evening and night time periods that the noise monitoring location can be considered an area of low background noise, during calm weather at least. Background noise surveys undertaken in 2012 in the vicinity of the Upperchurch Windfarm (see **2013 RFI**) demonstrated that this area is also an area of low background noise. As a result it is considered that background noise levels throughout the UWF Related Works study area are low, and therefore the threshold level of 65dB applies. It should be noted that the 60dB level is not applied because works will not take place beyond 7pm. In relation to UWF Grid Connection, the Mountphilips Substation site is located in a low background noise area and the 65dB threshold level applies to this location, however along the route of UWF Grid Connection 110kV UGC which is on the public road network, the 70dB level applies.

12.1.9.2 Methodology for Evaluating Operational Stage Noise

Operational Stage noise is limited to the UWF Grid Connection and Upperchurch Windfarm elements, specifically the Mountphilips Substation, the Consented UWF Turbines and the Consented UWF Substation, which will be new permanent sources of noise in their local environments.

12.1.9.2.1 Operational Phase Noise from the Upperchurch Windfarm

The consented UWF Turbines and the Consented UWF Substation will be required to meet strict noise limits as described in the Conditions of Planning. These noise limits, which are set out in Condition 11 of the Grant of Permission (2014), which apply at the nearest relevant receptors, are considered by the consenting authorities to be acceptable in terms of the protection of residential amenity, without unduly restricting wind farm development.

[4] $LAeq_{)}$: An indication of the average level of noise heard
[5] $LpA_{(Max)}$: An indication of the maximum sound level heard
[6] As stated in both the NRA Guidelines (2004) construction at these times or outside the times indicated in the table, except for emergency work, will require the explicit permission of the relevant local authority.

Condition 11: *Wind Turbine Noise arising from the proposed development by itself or in combination with other existing or permitted wind energy development in the vicinity shall not exceed the greater of (a) 5 dB(A) above background noise levels or (b) 43 dB(A) L90 10 min, when measured externally at dwellings of other sensitive receptors. (Ref: ABP 22.243040)*

12.1.9.2.2 Evaluating Operational Phase Noise from Mountphilips Substation (UWF Grid Connection)

Mountphilips Substation will be a new and permanent fixture in the environment and will emit noise. Through field measurements and observations (See Appendix 12.2 Noise Modelling & Background Noise Measurement) it has been determined that the receiving environment is a rural location with low background noise levels. For this reason it is considered appropriate to assess the potential impact with regard to the existing low noise levels.

The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment, November 2014, were used to evaluate the magnitude of impacts, the sensitivity of receptors and the level of significance of any effects during operation. The criteria outlined in Tables 12-11 to 12-13 have been sourced from these Guidelines.

Table 12-11: IEMA (2014) Guidelines for Evaluating the Magnitude of Noise Impact

EPA Terminology	Description	Perception of Effects
Negligible	No discernible change in the baseline environmental conditions, within margins of error of measurement	Not Noticeable
Small	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated	Noticeable and not intrusive
Medium	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be marginally exceeded or to result in undesirable/desirable consequences on the receiving environment.	Noticeable and intrusive
Large	Impact resulting in a considerable change in baseline environmental conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable/desirable consequences on the receiving environment.	Noticeable and disruptive

Table 12-12: IEMA (2014) Guidelines for Evaluating the Sensitivity of Receptor

EPA Terminology	Description
Negligible	Receptor/ resource is not sensitive to noise.
Low	Receptor/resource is tolerant of change without detriment to its character or is of low or local importance. For example industrial estates
Medium/ Moderate	Receptors/resource has moderate capacity to absorb change without significantly altering its present character. For example residential dwellings, offices, schools, and play areas. Locally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
High	Receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance. For example hospitals, residential care homes, and internationally and nationally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).

Table 12-13: IEMA (2014) Guidelines for Evaluating the Impact Significance Matrix

Magnitude	Sensitivity of Receptor			
	Negligible	**Low**	**Medium/ Moderate**	**High**

Negligible	None	None	None	None
Small	None	Slight	Moderate	Moderate
Medium	None	Moderate	Substantial	Substantial
Large	None	Moderate	Substantial	Very Substantial

12.1.9.3 TII Guidelines for Evaluating Vibration Effects

Vibration emissions are limited to the construction phase.

According to TII's 2014 Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, *'the NRA's Guidelines point out that there are two separate considerations for vibration during the construction phase: that which affects human comfort and that which affects cosmetic or structural damage to buildings. There is a third category: that which affects sensitive equipment or processes, which could include installations concerning gas, water, electricity and telecommunications.*

The Guidelines suggest that human tolerance for daytime blasting and piling, two of the primary sources of construction vibration, limits vibration levels to a peak particle velocity (ppv) of 12mm/s and 2.5mm/s respectively.

To avoid the risk of even cosmetic damage to buildings, the Guidelines suggest that vibration levels should be limited to 8mm/s at frequencies of less than 10Hz, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above'.

12.1.10 Methodology for Evaluating Electromagnetic Fields Effects

12.1.10.1 Treatment of the Existing Electricity and Communication Networks

The contribution to EMF levels from existing 110kV or 220kV overhead lines and the existing Foilnaman Mast is considered in Section 12-6 Cumulative Impacts. The local electricity and communications (eir) networks, on the other hand, are considered as part of the existing environment.

12.1.10.2 Treatment of Naturally Occurring Electric and Magnetic Fields

Naturally occurring electric and magnetic fields differ from the electromagnetic Fields (EMF) which are produced by the power system as naturally occurring EMF do not change direction and are, therefore, referred to as static or direct current (DC) fields, whereas EMF from power systems fluctuates at a fixed frequency and are referred to as alternating current (AC) fields.

As EMF from the two sources (natural, power systems) differ from each other, naturally occurring electric and magnetic fields are not included in the baseline environment.

12.1.10.3 Authors Methodology for Modelling Theoretical Worst-Case Effects

In order to categorically demonstrate that the maximum possible power load of the electric cables and equipment associated with the whole UWF project, will comply with the EU EMF Exposure Recommendations and the International Commission on Non-Ionising Radiation Protection (ICNIRP) limits, the theoretical worst-case contribution of the operational Whole UWF Project, to EMF levels in the environment is evaluated in this report. The criteria for modelling the worst-case levels of EMF are outlined in Appendix 12.3: Explanation and Modelling of EMF.

12.1.10.4 ICNIRP General Public Reference levels

In this EIA Report chapter, the compliance of the various electrical and radio communications elements of the whole windfarm has been evaluated against the directives and legislation listed in Section 12.1.6.1 above, and against the 1998 guidelines on limiting exposures to electromagnetic fields as published by the ICNIRP. The European Union and the Irish Government have adopted the ICNIRP 1998 guidelines, which are outlined in Table 12-14 below.

Table 12-14: ICNIRP 1998 EMF Limits

Exposure Characteristics ICNIRP	Electric Field Strength V/m	Magnetic Field Strength µT
1998 General Public Reference Level	5000	100
2010 General Public Reference Level	5000	200

The Irish Government Department of Communications, Marine and Natural Resources, have stated “No adverse health effects have been established below the limits suggested by international guidelines”.

12.1.10.5 Authors Methodology for Evaluating the Magnitude and Significance of Impacts

The significance of the impact for each identified sensitive receptor will be assessed according to the impact magnitude according to Table 12-15 and Table 12-16.

Table 12-15: Determining magnitude and significance of effects in relation to Electric Fields

Magnitude		Significance of Effects		
Magnitude Rating	Field Strength	Local Residents & Community	Transient People	Electronic Equipment
Very Low (1)	< 1 V/m	**Imperceptible** Similar to existing ambient levels	**Imperceptible** Similar to existing ambient levels	**Imperceptible** Similar to existing ambient levels
Low (2)	1V/m - 1000 V/m	**Slight** Similar to existing ambient levels from residential electric equipment	**Imperceptible** Higher than existing ambient levels	**Imperceptible** Similar to existing ambient levels from Electric Equipment
Medium (3)	1000 V/m-5000 V/m	**Slight** Under EU EMF limits Under HSA Low Action limit	**Slight** Significantly higher than existing ambient levels but length of exposure is momentary or brief	**Slight to moderate** Above existing ambient levels from Electric Equipment
High (4)	5000 V/m -10000 V/m	**Moderate** Above EU EMF limits Above HSA Low Action limit	**Moderate** Above EMF limits although not applicable	**Significant** Above EU AIMD[7] Device Immunity Test levels
Very High (5)	>10000 V/m	**Profound** Above EU EMF limits Above HSA High Action limit	**Significant to Profound** Significantly above AIMD Immunity Test Level	**Profound** Significantly above electrical device test levels

[7] AIMD is the abbreviation for 'Artificial Implantable Medical Devices' such as pacemakers and defibrillators

Table 12-16: Determining magnitude and significance of effects in relation to Magnetic Fields

Magnitude		Significance of Effects		
Magnitude Rating	**Field Strength**	**Local Residents & Community**	**Transient People**	**Electronic Equipment**
Very Low (1)	< 0.1 to 1.26 µT (micro Tesla)	**Imperceptible** Similar levels to existing ambient levels	Imperceptible Similar to existing ambient levels	**Imperceptible** Similar to existing ambient levels Below EU Residential and Light Industrial Electronic device Immunity limit (1.26 µT)
Low (2)	1.26-38 µT	**Imperceptible** Higher than existing ambient levels Under EU EMF limits Under HSA public limit	**Imperceptible** Higher than existing ambient levels	**Imperceptible to Slight** Above EU Residential and Light Industrial Electronic device Immunity limit (1.26 µT)
Medium (3)	38-100 µT	**Slight** Under EU EMF limits Under HSA public limit	**Imperceptible to Slight** Significantly Higher than existing ambient levels but exposure not long term	**Slight** Above EU Industrial Electronic device Immunity limit (38 µT)
High (4)	100-1000 µT	**Moderate** EU EMF limits exceeded HSA Low Action Level reached	**Moderate** Above EU EMF limits although not applicable	**Moderate to Significant** Above EU AIMD Device test levels
Very High (5)	>1000 µT	**Significant** EU EMF and HSA levels breached **Profound** > 6000 µT HSA High Action Level reached	**Significant to Profound** EU EMF and HSA levels breached but not applicable to transient people Above Test Levels for AIMD Devices	**Profound** Significantly above All Electrical Device test levels

12.2 Sensitive Aspect No.1: Local Residents & Community

This Section provides a description and evaluation of the Sensitive Aspect - Local Residents & Community.

12.2.1 BASELINE CHARACTERISTICS of Local Residents & Community

12.2.1.1 STUDY AREA for Local Residents & Community

The study area for Local Residents & Community in relation to the UWF Related Works is described in Table 12-17 and illustrated on Figure RW 12.2: Local Residents & Community (Dust & Noise) within the UWF Related Works Study Area and Figure RW 12.2.2: Local Residents & Community (EMF) within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 12-17: UWF Related Works Study Area for Local Residents & Community

Study Area for Local Residents & Community	Justification for the Study Area Extents
Construction Stage Air Quality: Dwellings and community facilities within 350m of construction works areas & within 50m of main transport routes used by construction vehicles – See Figure RW 12.2.1.	Based on Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, and the Guidance on the Assessment of Dust from Demolition and Construction.
Construction Stage Noise and Vibration: 350m from construction work areas. – See Figure RW 12.2.1.	Based on the Guidelines for the Treatment of Noise and Vibration in National Road Schemes, the Guidelines recommend that receptors within 300m of a route be identified, however in the interest of simplicity, the wider Air Quality study area of 350m from construction works is used in the appraisal.
Operational Stage EMF: 100m from Internal Windfarm Cabling - See Figure RW 12.2.2.	Based on professional judgement, EMF Field emissions can extend to this distance. At distances greater than 100m from the Internal Windfarm Cabling, the contribution of the Internal Windfarm Cabling to ambient EMF levels will be extremely low or none, with effects being considered, neutral or none.

12.2.1.2 Baseline Context and Character of Local Residents & Community in the UWF Related Works Study Area

The number of local residences within the UWF Related Works Study Area are outlined on Table 12-18 and included on Figures RW 12.2 (Figure RW 12.2.1 and Figure RW 12.2.2). There are no community facilities within the UWF Related Works Study Area.

Table 12-18: Number of Local Residences and Community within the cumulative study area

Individual Project Element	Local Residents & Community within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Local Residents & Community within 50m of Materials Haulage Routes (Air Quality only)	Local Residents & Community within 100m Of Electrical Parts (EMF only)
UWF Related Works	41 No. residences (9 no. within 50m) No community facilities	33 No. residences along local roads between the consented Upperchurch Windfarm Site Entrance No.1 and the various consented Upperchurch Windfarm site entrances (R503, R497, R503, L6182, L-2264-50, L2264-34, L-6188-0, L-61881-0, L-4139-16, L-4138-1 and L-6185-13). No community facilities.	9 No. local residences within 100m of the Internal Windfarm Cabling No community facilities

Air Quality: All residential properties and community facilities, within the UWF Related Works Study Area, are located within EPA Air Quality Monitoring Zone D. Overall, there is a good air quality baseline for the area. Background concentrations of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) are very low in this area and are substantially below the EU limit values. Further details on the the limit values and on baseline air quality are included in Appendix 12.1: Air Quality Monitoring & Standards.

Noise: Background noise surveys undertaken in 2012 in the vicinity of the Upperchurch Windfarm (see **2013 RFI**) demonstrated that this area is also an area of low background noise.

Vibration: There are no significant sources of vibration in the area.

EMF: Electrical objects and anything connected to them produce two types of fields - electric fields and magnetic fields. Electric and magnetic fields are produced in all residential and working environments as a result of nearby electrical wiring, appliances, power lines and telecommunication masts, among other things. Electric fields are measured in volts per meter (V/m), and magnetic fields measured in microtesla (µT). The ICNIRP guideline levels (See Section 12.1.10.4) in relation to the general public for exposure to frequency EMF associated with electrical power systems, is 5000V/m for electric fields exposure and 100µT for magnetic field exposure. It is assumed in this report that the existing electric field and magnetic field levels, at local residential dwellings and community facilities, are 10V/m and 0.2 µT respectively, which is substantially under the ICNIRP guideline levels. Further details on electric and magnetic fields and typical levels from common household appliances and from 110kV electrical power system infrastructure is included in Appendix 12.3: Explanation and Modelling of EMF.

EMF – Electronic Equipment: Two types of electronic equipment are evaluated in this section electronic equipment or appliances which are assumed to be used in all local residences, businesses and community facilities and Artificial Implantable Medical Devices (AIMDs) such as pacemakers which could be worn by local residents or members of the community within 100m of the Internal Windfarm Cabling. Currently, the EMF levels to which electronic equipment is being exposed to is likely to be in the region of 0.2 µT.

12.2.1.3 Importance of Air (Local Residents & Community)

Air Quality: The low number of residential properties is common in rural, upland areas of Ireland, as is their distribution with the majority of properties and community facilities centred around small rural villages. In general there is a reasonable expectation for a good quality of air in these upland areas which are remote from busy, congested roads and industrial sources of air pollutants.

Noise: Rural environments are generally regarded as quiet areas, in contrast to urban areas. Areas with low background noise levels are recognised as having a greater amenity and quality of life value.

EMF: The ICNIRP guidelines form the basis of the EU guidelines for human exposure to EMF (EC Council Recommendation 1999/519/EC[8]). These exposure guidelines apply only where members of the public could be expected to spend significant periods of time (EC, 1999). In this report, these members of the public relate to local residents and users of local community facilities including businesses.

Electronic equipment such as washing machines and other electrical appliances in local residences, business premises or community facilities are required, under EU legislation (EMC Directive 2013/30/EU), to have an immunity level of at least 1.26 µT for a 50 Hz magnetic field, to safeguard the normal operation of the electronic device from interruption or degradation caused by EMF.

Artificial Implantable Medical Devices (AIMDs) which may be worn by local residents or members of the community, such as pacemakers are tested to higher EMF Immunity levels to safeguard operation according

[8] https://ec.europa.eu/health/sites/health/files/electromagnetic_fields/docs/emf_rec519_en.pdf

to EU regulations (CENELEC 50527-1:2010). A limit of 100 µT applies to 50 Hz magnetic fields and 5000 V/m to 50 Hz electric fields. It should be noted that these are the same limits as the ICNIRP limits adopted by the EU for the general public and used in this chapter of the EIA Report.

12.2.1.4 Sensitivity of Local Residents & Community

Air Quality: Local residents and people using community facilities could be sensitive to health effects such as respiratory illnesses as a result of breathing polluted air. All local residences and community facilities are considered 'high-sensitivity' locations (see Table 12-5).

Based on the receptor sensitivity (**high**), the number of receptors (**9 dwellings in worst-case location**) and their distance from the source (**less than 50m** in worst-case location), and the assumption based on EPA monitoring that annual mean background level of PM_{10}, are well below the objective limit and substantially less than 24 µg/m^3, it is considered that sensitivity of the local residences and community facilities to dust soiling or human health effects is considered '**Low**' under the IAQM assessment guidance.

Noise & vibration: Local residents and communities are considered as medium sensitive receptors (See Table 12-12).

EMF: Local Residents and members of the community could raise health concerns if the levels of EMF Exposure within their residences and premises are deemed to breech the 1998 ICNIRP limits. A substantial increase in EMF levels above EU electric and electronic equipment Immunity test levels could cause the malfunction of equipment. **Note**: Electronic Equipment in machinery and vehicles are not commonly susceptible to 50 Hz magnetic fields, and are excluded from further consideration in this EIA Report

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

Air Quality: If the works do not proceed, the baseline levels of dust including PM_{10} and $PM_{2.5}$ are likely to remain at existing levels. In Ireland the primary sources of Particulate Matter (PM_{10} and $PM_{2.5}$) are vehicular emissions and burning of solid fuels for heating. Due to the nature of the area (remotely populated with no congested roads) PM emissions are unlikely to change dramatically in future years. Small fluctuations are likely in line with previous trends.

Noise: With the exception of Milestone Windfarm which was constructed in 2018 and located on lands in close proximity to UWF Related Works, there have been no increases or decreases in sources of background noise in the local area. The trend of wind energy development in the area will continue with the construction of the Consented Upperchurch Windfarm.

EMF: Electrical and Users of Electronic Equipment and radio frequency technology will increasingly become more present in everyday life; the expansion of the power infrastructure in the country is also expected albeit at a much slower rate; however government regulations will ensure EMF levels remain significantly lower than the ICNIRP standard limits.

12.2.1.6 Receiving Environment (the Baseline + Trends)

Air Quality: There are no specific future trends for construction dust emissions in the area of the whole UWF project. It is assumed that in relation to dust, the receiving environment will be similar to the baseline environment.

Noise: The receiving environment at the time of construction will include the Milestone Windfarm as part of baseline noise sources, but will not include operational Consented UWF Turbines.

EMF: A continued adoption of electrical and electronic infrastructure and equipment, will increase the background level of EMF at a very slow rate over time. It is not expected for EMF levels to increase

significantly above existing average levels of 10V/m or 0.2µT and the receiving environment during the operational stage is assumed to be similar to the baseline environment identified above.

12.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

12.2.2.1 Cumulative Evaluation Study Areas

12.2.2.1.1 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 Local Residents & Community	Justification for the Study Area Extents
Construction Dust, Noise & Vibration: Air Quality, Noise & Vibration: 700m from UWF Related Works construction works, 50m from main transport routes, Operational EMF: 200m from Internal Windfarm Cabling	Local Residents & Community could potential be effected by dust, noise, vibration and EMF sources from different directions either at the same time or sequentially and therefore the distance from the source was doubled from that used for the UWF Related Works (the exception being noise along haulage routes, which remains the same, as cumulative impacts related to any additional traffic on the haul routes).

The study area is illustrated on Figure CE 12.2.1: Local Residents & Community (Dust, Noise) within the UWF Related Works Cumulative Evaluation Study Area and on Figure CE 12.2.2: Local Residents & Community (EMF) within the UWF Related Works Cumulative Evaluation Study Area.

12.2.2.1.2 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 12.2.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements as described in Table 12-19, and illustrated on Figure WP 12.2.1: Local Residents & Community (Dust, Noise) within the Whole Project Cumulative Evaluation Study Area and Figure WP 12.2.2: Local Residents & Community (EMF) within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 12-19: Whole Project Cumulative Evaluation Study Area for Local Residents & Community

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Construction Dust, Noise & Vibration: Air Quality, Noise & Vibration: 700m from construction works, 50m from main transport routes, Operational Noise: 800m from both the Mountphilips Substation and Consented UWF Substation	Local Residents & Community could potentially be effected by sources of dust, Noise, vibration and EMF sources from different directions (i.e. different projects) either at the same time or sequentially and therefore the distance from the source was doubled from that used for direct and indirect effects (the exception being noise along haulage
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 5: UWF Other Activities	Operational EMF: 200m from 110kV UGC, Internal Windfarm Cabling, Consented UWF Turbines and Consented UWF Substation.	routes, which remains the same, as cumulative impacts related to any additional traffic on the haul routes).

12.2.2.2 Scoping for Other Projects or Activity & Potential for Impacts

The evaluation of cumulative impacts to Local Residents & Community 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 Local Residents & Community 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 A2.3.2.12).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Local Residents & Community with UWF Related Works however in order to present the totality of the project – the existing Shannonbridge – Killonan 220 kV OHL has been scoped in for evaluation of cumulative effects relating to the Other Elements (in particular UWF Grid Connection). The location of the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure WP 12.2.1 and Figure WP 12.2.2.

12.2.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Local Residents & Community

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 Local Residents & Community. The results of this evaluation are included in Table 12-20. The baseline character of the areas around these projects is described in Section 12.2.2.3.

Table 12-20: 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	Evaluated as excluded: Neutral Impacts or No Impacts due to: • The planting of the new woodland will have a neutral impact on air quality as works will be carried out by hand using spades, with use of vehicles limited to personnel vehicles and negligible traffic volumes associated with the planting stage. • No potential for adverse air quality impacts during the growth stage, due to the absence of dust creating activities and negligible traffic volumes. • There is no potential for noise or vibration effects, as there will be no sources of mechanical noise or vibration because planting will be carried out by hand (Project Design Measure) in grassland fields. • During the growth stage, chainsaws may be used during thinning activities, however this type of activity will be infrequent, brief in nature and at

	a distance from local residents, therefore it is considered that noise related impacts will be neutral during any thinning activities during the growth stage. • There is no potential for impacts due to EMF emissions as there are no electrical or radio-communication parts associated with the UWF Replacement Forestry.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral Impacts or No Impacts due to: • Neutral effect on Air Quality - any activities will be of a very short duration, minimal extent and will involve minimal use of vehicles or equipment. • Neutral effect on ambient noise or vibration levels due to the momentary to brief duration of activities at any one location, and the generally low-medium noise levels of the equipment used. Equipment which will be used includes a hedge cutter, tractor, vans, and cable-pullers and hand tools. Activities will take between 15 minutes and 2 days to complete at the various locations Specifically in relation to Haul Route Activities, any noise or vibration emitted by machinery or vehicles used will be in the context of background noise and vibration from regional or national roads, or will not be noticeable in the context of local traffic and farming activity. • No potential for increases in ambient EMF levels, as there are no electrical or radio-communication parts associated with the Overhead Line Activities.
Other Projects or Activities	
Shannonbridge – Killonan 220kV OHL (existing)	Yes, included for the evaluation of cumulative effects in relation to EMF effects. Evaluated as excluded in relation to dust, noise or vibration effects, as there is no potential for cumulatively effects because the 220kV OHL already exists and therefore no construction works are associated with this line and no upgrade works are expected to occur during the construction stage of the UWF Grid Connection. No potential for cumulative operational noise effects due to separation distances to nearby houses. **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.

Local Residents & Community

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12.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

12.2.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

The number of local residences and community facilities within the UWF Grid Connection study area are outlined on Table 12-21 and included on Figures WP 12.2 (Figure WP 12.2.1 and Figure WP 12.2.2).

12-21: Number of Local Residences and Community within the Cumulative Evaluation Study Area

Individual Project Element	Local Residents & Community within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Local Residents & Community within 50m of Materials Haulage Routes (Air Quality only)	Local Residents & Community within 100m Of Electrical Parts (EMF only)
UWF Grid Connection	866 No. residences 91 No. community facilities	371 No. residences, and 68 No. community facilities within 50m of material haulage routes.	None within 100m of the Mountphilips Substation. 532 No. local residences and 74 No. community facilities within 100m of the 110kV UGC.

Air Quality: All residential properties and community facilities, within the Study Area, are located within EPA Air Quality Monitoring Zone D. Overall, there is a good air quality baseline for the area. Background concentrations of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) are very low in this area and are substantially below the EU limit values.

Noise: Baseline noise monitoring undertaken at the Mountphilips Substation location confirms that the area surrounding the substation is an area of low background noise (See Appendix 12.2: Noise Modelling & Background Noise Measurement). Considering the location of the 110kV UGC along the public road network, the route of the 110kV UGC is not located in an area of low background noise.

Vibration: There are no significant sources of vibration in the area.

EMF: It is assumed in this report that the existing electric field and magnetic field levels, at local residential dwellings and community facilities, are 10V/m and 0.2 µT respectively, which is substantially under the ICNIRP guideline levels.

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Knocknabansha, Knockmaroe, Knockcurraghbola Commons, and Knockcurraghbola Crownlands where the 110kV UGC is located the public roads R503, L2264-50 and L-6188-0 and along the forestry road to the Consented UWF Substation.

12.2.2.3.1 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 12.2.2.2.1

12.2.2.3.1 Element 4: Upperchurch Windfarm

The number of local residences and community facilities within the Upperchurch Windfarm Study Area are outlined on Table 12-22 and included on Figures WP 12.2 (Figure WP 12.2.1 and Figure WP 12.2.2).

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12-22: Number of Local Residences and Community within the Cumulative Evaluation Study Area

Individual Project Element	Local Residents & Community within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Local Residents & Community within 50m of Materials Haulage Routes (Air Quality only)	Local Residents & Community within 100m Of Electrical Parts (EMF only)
Upperchurch Windfarm	32 No. local residences within 350m of construction works areas associated with Upperchurch Windfarm, . No community facilities	33 No. residences along local roads between the Upperchurch Windfarm Site Entrance No.1 and the various Upperchurch Windfarm site entrances (R503, R497, L-4139-0, L-2264-50, L2264-34, L-6188-0, L-4138-12 and L-6185-13). 3 No. of which are within 50m of site entrances. No community facilities	None: No local residences or community facilities within 100m of the Consented UWF Turbines or Consented UWF Substation.

Air Quality: Overall, there is a good air quality baseline for the area. Background concentrations of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) are very low in this area and are substantially below the EU limit values.

Noise: The majority of the Cumulative Evaluation Study Area can be characterised as a quiet rural location with no major existing or dominating noise or vibration sources.

Vibration: There are no significant sources of vibration in the area.

EMF: It is assumed in this report that the existing electric field and magnetic field levels, at local residential dwellings and community facilities, are 10V/m and 0.2 µT respectively, which is substantially under the ICNIRP guideline levels.

Consideration of the Passage of Time: There have been no new houses built within 350m of the Upperchurch Windfarm since 2013, and while the Milestone Windfarm was built in 2018, and is now operational, this windfarm was considered cumulatively in the 2013 and 2014 assessments for the consented Upperchurch Windfarm. Therefore it is considered that the descriptions in the 2013 and 2014 documents remain relevant to the cumulative evaluations in this Revised EIAR

12.2.2.3.2 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 12.2.2.2.1

12.2.2.3.3 Other Projects or Activities

Shannonbridge – Killonan 220kV OHL: There is 1 No. local residence (no community facilities) within 100m of both the 110kV UGC (95m distance) and the existing 220kV OHL (53m distance). This residence is located in Coole townland on the L2166-0.

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.

12.2.3 PROJECT DESIGN MEASURES for Local Residents & Community

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 12-23 are relevant to the Environmental Factor, Air, and in particular to the sensitive aspect **Local Residents & Community**.

Table 12-23: UWF Related Works Project Design Measures relevant to Local Residents & Community

PD ID	Project Design Environmental Protection Measure (PD)
PD01	All construction works will be carried out during daylight hours.
PD03	Construction works in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Grid Connection or Upperchurch Windfarm.

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 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.

12.2.4 EVALUATION OF IMPACTS to Local Residents & Community

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) - Local Residents & Community.

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

Table 12-24: 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)*
Increase in Airborne Dust (construction stage)	*Increase in ambient electromagnetic fields (EMF) levels (construction stage)*
Increase in ambient noise levels (construction stage)	*Vibration damage to buildings or internal nuisance to residents (construction stage)*
Increase in ambient noise levels (operational stage)	*Decrease in ambient air quality as a result of traffic derived pollutants (NO_2, PM_{10}, $PM_{2.5}$, CO, Benzene (construction stage)*
Increase in ambient EMF levels (operational stage)	*Vibration emissions during the 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 12.2.4.1 to 12.2.4.4.**

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 12.2.4.5.

Local Residents & Community

Sensitive Aspect

12.2.4.1 Impact Evaluation Table: Increase in Airborne Dust

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Delivery of construction materials to works area, excavation and storage of materials.
Cumulative Impact Source: Delivery of construction materials to works area, excavation and storage of materials
Impact Pathway: Air/Wind

Impact Description: During dry and windy weather conditions, construction dust emissions will arise from construction activities such as excavations, earth moving and backfilling may generate quantities of dust. Vehicles transporting potentially dusty material to and from the site also have the potential to cause dust generation along the concentrated haul routes from the construction areas. Dust deposition rates will be greatest within 50 m of the source. An increase in airborne dust can cause dust soiling effects at property and increase the risk of respiratory illness to local residents and members of the local community.

Impact Quality: Negative

Evaluation the Subject Development Impact – Increase in Airborne Dust

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
The emission of dust from excavation and backfilling of 11,830m^3 of potentially dusty materials (rocks, soils etc.), the storage and handling of 930m^3 of this material on site, and the delivery of 292 loads of potentially dusty materials to site (aggregate). The potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. There are 41 No. local residences but NO community facilities within 350m of the UWF Related Works construction works areas.
There are 33 No. local residences are within 50m of haulage routes along local roads between the Upperchurch Windfarm site entrance No.1 and other various site entrances along local roads. There are 51 No. residents in total within 50m of haulage routes and within 350m of the UWF Related Works construction works areas.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- **low** risk of human health or dust soiling impacts as a result of earthworks, construction and trackout, as per Table 12-5;
- temporary duration of works,
- the reversibility of the impact,
- transitory and predominantly linear nature of the works;
- 15 of 51 No. properties are greater than 50m from the works areas and haul routes;
- background levels of particulate matter are substantially below the relevant EU limit values

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative in-combination effects relates to construction stage dust from UWF Related Works, Upperchurch Windfarm and to a lesser extent UWF Grid Connection construction works and construction related haulage.
There are 41 No. local residences within with UWF Related Works Cumulative Evaluation Study Area, 32 No. of these residences are within 350m of UWF Related Works and Upperchurch Windfarm construction works, 29 No. are within 350m of UWF Related Works and UWF Grid Connection construction works, and 23 No. are within 350m of all three projects (i.e. UWF Related Works, Upperchurch Windfarm, and UWF Grid Connection).

UWF Related Works will use the same construction material haul routes as Upperchurch Windfarm, there are 33 No. local residences within 50m of these routes. Of these residences, 19 No. are also located within 50m of

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UWF Grid Connection haul routes which overlap the UWF Related Works haul routes (R503, L-2264-50 and L6188-0).

The potential for cumulative effects is concentrated in the Knocknabansha / Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area. To protect Residential Amenity of residents along this road, the sequential timing of construction works which is part of the UWF Related Works project design (See Section 12.2.3), will ensure that local residences are not effected by multiple construction works being carried out at the same time. Therefore, there is no potential for in-combination effects, and any cumulative effects relate to a slightly longer duration of effects (sequential effects) rather than a larger magnitude of effects.

There is no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- low risk of human health or dust soiling impacts as a result of earthworks, construction and trackout, as per Table 12-5,
- temporary duration of works, even when considered sequentially,
- the reversibility of the impact,
- transitory and predominantly linear nature of the works;
- background levels of particulate matter are substantially below the relevant EU limit values

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

Element 1: UWF Grid Connection

Impact Magnitude: The emission of dust from excavation and backfilling of 26,280m^3 of potentially dusty materials (rocks, soils etc.), the storage and handling of 3,770m^3 of this material on site, and the delivery of 1,320 loads of potentially dusty materials to site (aggregate). The potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. There are 866 No. local residences and 91No. of community facilities within 350m of the UWF Grid Connection construction works areas. In addition, there are 371 No. local residences within 50m of haulage routes along public roads R503, L2166-0, L2264-50 and L6188-0.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- **low risk** of human health or dust soiling impacts as a result of earthworks, construction and trackout, as per Table 12-5;
- temporary duration of works;
- the reversibility of the impact,
- transitory and predominantly linear nature of the works
- the majority of properties are greater than 50m (495 of 866 No.) from the works areas and haul routes;
- background levels of particulate matter are substantially below the relevant EU limit values

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: As per the 2013 EIS, approximately 108,000m3 of material will be excavated as part of the construction phase of the Upperchurch Windfarm; Six borrow pits will be constructed to quarry stone; 4.4ha of forestry will be felled; delivery of 4,960 loads of materials will be brought to site to construct 22 No. turbines and the associated concrete bases.

Significance of the Impact: No significant Impact

Local Residents & Community

Sensitive Aspect

Rationale for Impact Evaluation:

- The **ABP Inspectors Report 2014** found that there were no significant impacts to Air Quality and any dust impacts are considered 'temporary in nature and confined to the immediate area'.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

Evaluation of Other Cumulative Impacts – Increase in Airborne Dust

Whole UWF Project Effect

Cumulative Impact Magnitude:
The extent of impacts from the whole project relates to 878 no. of local residences and 91 No. community facilities/businesses which are within 350m of construction works associated with Whole UWF Project Elements, and 360 No. local residences and 68. no community facilities/business which are within 50m of construction material haul routes.

The potential for cumulative in-combination effects of all of the elements of the Whole UWF Project is limited to local residences located along the L2264-50 and L6188-0 local roads in the Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, which construction works associated with the UWF Related Works, Upperchurch Windfarm and UWF Grid Connection are located within 350m of 20 No. of local residences. To protect Residential Amenity of residents along this road, the sequential timing of construction works is built into the project design (See Section 12.2.3), to ensure that local residences are not effected by multiple construction works being carried out at the same time. Therefore, there is no potential for in-combination effects, and any cumulative effects relate to a slightly longer duration of effects rather than larger magnitude of effects.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- low risk of human health or dust soiling impacts as a result of earthworks, construction and trackout, as per Table 12-5,
- temporary duration of works, even when considered sequentially,
- the reversibility of the impact,
- transitory and predominantly linear nature of the works;
- background levels of particulate matter are substantially below the relevant EU limit values

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 12.2.2.2.1).

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12.2.4.2 Impact Evaluation Table: Increase in Ambient Noise Levels

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Working plant and moving machinery and excavation activities
Cumulative Impact Source: Working plant and moving machinery and excavation activities
Impact Pathway: Air

Impact Description: Noise emissions from working plant or machinery, moving vehicles and the physical excavation of the ground will increase the levels of outdoor noise during works in any particular area. Construction works will predominately be linear and will progress quickly, and will be carried out during regular working hours. The main item of plant to be used will be a tracked or wheeled excavator, which will emit 79dB of noise at a separation distance of 10m. This is a piece of machinery with similar noise emissions to an agricultural tractor, which are commonplace in the area. A dumper is also likely to be in use at the same time as the excavator, and together these two pieces of machinery will emit 81dB of noise at a separation distance of 10m.

The NRA Guideline thresholds for construction noise emissions in an area of low background noise is 65dB (A), otherwise the threshold level is 70dB (A). As detailed in Appendix 12.2: Noise Modelling & Background Noise Measurement, modelling of the worst case effect was carried out, and demonstrates that maximum worst case noise emissions from construction machinery would be 86dB at 10m distance from works, reducing to 56dB at 350m from works. However, this modelling is very conservative and only attenuates noise based on distance and assumes that all machinery, listed in Ch.5, is working at the same location at the same time. Realistically construction noise will not exceed the 65dB (A) construction threshold beyond 60m, and will not exceed the 70dB (A) threshold at approximately 30m.

Impact Quality: Negative

Evaluation the Subject Development Impact – Increase in Ambient Noise Levels

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude: Construction works will be taking place at several distinct locations at any one time.
There are 41 No. local residences, but no community facilities, within 350m of UWF Related Works construction works areas. These receptors are located along the public road network close to the public road crossing points of Internal Windfarm Cables or close to Haul Route Works. 9 No. of the 41 No. residences are within 50m of the construction works areas.
Realistically construction noise will not exceed the construction limit beyond 60m.

Significance of the Impact: Moderate

Rationale for Impact Evaluation:

- the NRA threshold limits are likely to be exceeded, at some locations
- The low number of receptors (41 No.) within 350m of the works in the context of the spread of construction works over a large area, with works within 350m of a receptor typically completed within 10 days
- The very low number of houses at which the guideline thresholds will be exceeded – there are only 9 No. dwellings within 50m.
- The temporary duration of exceedance of the guidelines thresholds (generally less than 1 week)
- The compliance with the guideline limits at all properties which are located farther than 60m (realistic case) from works areas
- The reversibility of the effect with the completion of works
- The carrying out of works during daytime hours

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- The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13).

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative in-combination effects relates to additional construction stage noise from Upperchurch Windfarm and to a lesser extent UWF Grid Connection where their construction works occur within the UWF Related Works Cumulative Evaluation Study Area. The study area is 350m, however realistically construction noise will not exceed the construction limit beyond 60m.
Cumulative impacts could occur at:

- 32. No local residences within 350m of UWF Related Works and Upperchurch Windfarm construction works areas – 3 no. of these residences are within 60m of construction works areas.
- 29. No local residences within 350m of UWF Related Works and UWF Grid Connection construction works areas – 20 no. of these residences are within 60m of construction works areas; and
- 23. No local residences within 350m of UWF Related Works and Upperchurch Windfarm and UWF Grid Connection construction works areas – 3 no. of these residences are within 60m of construction works areas

The potential for cumulative effects is concentrated in the Knocknabansha / Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area. To protect Residential Amenity of residents in this area, the sequential timing of construction works is built into the UWF Related Works project design (See Section 12.2.3), to ensure that local residences are not effected by multiple construction works being carried out at the same time. Therefore, there is no potential for in-combination effects, and any cumulative effects relate to a slightly longer duration of effects (sequential effects) rather than larger magnitude of effects.

There is no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works.

Significance of the Cumulative Impact: Moderate

Rationale for Cumulative Impact Evaluation:

- the NRA threshold limits are likely to be exceeded, at some locations
- The relatively low number (23 No.) of houses which could be affected by sequential effects,
- The temporary total duration of exceedance of the guidelines thresholds,
- The compliance with the guideline limits at all properties which are located farther than 60m (realistic case) from works areas
- The reversibility of the effect with the completion of works
- The carrying out of works during daytime hours
- The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13)

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

Element 1: UWF Grid Connection

Impact Magnitude: Construction works will be taking place at up to 5 different locations along UWF Grid Connection works areas at any one time – i.e. 1 crew working at the Mountphilips Substation, and up to 6 crews working at other UWF Grid Connection locations along the 28.9 km long 110kV UGC route.

There are no local residences or community facilities within 350m of the Mountphilips Substation - the closest residence is 385m to the east.

There are 866 No. local residences and 91 No. community facilities (mainly in Newport) within 350m of the 110kV UGC construction works areas. These receptors are located along the public road network, where the normal construction threshold of 70dB(A) applies. 271 No. of the 866 No. residences are within 30m of the construction works areas. Realistically construction noise will not exceed the 70dB(A) construction limit beyond 30m.

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Significance of the Impact: Moderate
Rationale for Impact Evaluation: • The NRA threshold limits are likely to be exceeded, at some locations • Not all receptors will be impact simultaneously, with only small numbers of receptors impacted at any one time due to the progressive linear nature of the works. • The relatively short exposure during normal working hours with works within 350m of a receptor typically completed within 10 days. • The temporary duration of potential exceedance of the guidelines limits (generally less than 1 week) • The compliance with the guideline limits at all properties which are located farther 30m (realistic case) from works areas on the public road network • The reversibility of the effect with the completion of works • The carrying out of works during daytime hours • The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13).
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.2.2.2.1*
Element 4: Consented Upperchurch Windfarm
Impact Magnitude: There are 30 No. residences within 350m of the Upperchurch Windfarm works areas – specifically Site Entrances. However, there are no dwellings within 350m of the turbine hardstands which will be the main locations of noise emissions. As per the RFI 2013, the results of the construction noise predictive modelling indicate that the appropriate threshold of significance (65dB(A)) as outlined in BS5228-1:2009 will not be exceeded beyond 200m. There are no dwellings within this distance from turbine hardstand areas. As per the 2013 ABP Inspectors Report – 'The construction phase will be significant as there will be some level of disturbance arising in particular in relation to increased noise, air emissions and traffic but the overall range of impacts in the construction phase will be of a short term duration'
Significance of the Impact: Not be significant
Rationale for Impact Evaluation: As per the 2013 Inspectors Report: • The short term duration of works. • The appropriate construction noise threshold (65dB (A)) as outlined in the RFI will not be exceeded beyond 200m, under conservative worst-case modelling scenario
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.2.2.2.1*
Evaluation of Other Cumulative Impacts – Increase in Ambient Noise Levels
Whole UWF Project Effect
Cumulative Impact Magnitude: The extent of impacts from the whole project relates to 878 no. of local residences and 91 No. community facilities/businesses which are within 350m of construction works associated with the Whole UWF Project. The vast majority of these properties are located along the public road network on the UWF Grid Connection 110kV UGC route. The potential for cumulative in-combination effects of all of the elements of the Whole UWF Project is limited to the 23 No. local residences located along the L2264-50 and L6188-0 in the Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, which are within 350m of construction works associated with UWF Related Works; Upperchurch Windfarm; and UWF Grid Connection;. To protect Residential Amenity of residents along these roads, the sequential timing of construction works is built into the project design (See Project Information, Section 12.2.4), to ensure that local residences are not effected by multiple construction

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works being carried out at the same time. Therefore, there is no potential for in-combination effects, and any cumulative effects relate to a slightly longer duration of effects rather than larger magnitude of effects.
Significance of the Cumulative Impact: Moderate
Rationale for Cumulative Impact Evaluation: • the NRA threshold limits are likely to be exceeded, at some locations • The low number (23 No.) of houses which could be affected by sequential effects, • The temporary total duration of exceedance of the guidelines thresholds, • The compliance with the guideline limits at all properties which are located farther than 60m (realistic case) from UWF Related Works/Upperchurch Windfarm areas and located farther than 30m from UWF Grid Connection 110kV UGC works areas on the public road • The reversibility of the effect with the completion of works • The carrying out of works during daytime hours • The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13)

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 12.2.2.2.1).

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12.2.4.3 Impact Evaluation Table: Increase in Ambient Noise Levels

Evaluation of UWF Related Works Excluded: As there will be no sources of operational noise from any part of the UWF Related Works, there will be no potential for UWF Related Works to cause increases in ambient noise levels at local residences by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Related Works is part of a whole project. Therefore, the cumulative information and evaluation for the Other Elements of the Whole UWF Project are included in this Impact Evaluation Table, in order to show the totality of the project.

Cumulative Impact Description for the Other Elements of the Whole UWF Project	
Project Life Cycle Stage: *(for Other Elements only)*	Operational stage
Impact Source: n/a Cumulative Impact Source: Operational Mountphilips Substation Operational Consented UWF Turbines, Consented UWF Substation Impact Pathway: Air Impact Description: Noise emissions from operational plant such as the operational Mountphilips Substation, or operational Consented UWF Turbines and Consented UWF Substation will increase the levels of outdoor noise in the vicinity of these structures. Impact Quality: Negative	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
Impact Magnitude: There are 6 No. local residences (no community facilities) within 400m of the Mountphilips Substation. The nearest residence is 385m to the east of the substation along the L2166-0 local road. For the purpose of this assessment a noise measurement was taken from a representative substation at a wind farm in County Kerry. A noise level of 60 dB(A) was measured at 5m, which would result in a worst case of 22dB at 385 m. This is well below the low background noise threshold of 35dBA for low background noise locations. As per Table 12-11, noise levels from the Mountphilips Substation will be negligible and will have no discernible effect on local residents.	
Significance of the Impact: No Impact	
Rationale for Impact Evaluation: • there will be no discernible change in the baseline environmental conditions – See Appendix 12.2: Noise Modelling & Background Noise Measurement for further details on modelling of operational noise emissions	
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.2.2.2.1*	
Element 4: Consented Upperchurch Windfarm	
Impact Magnitude: As per the ABP Inspectors Report 2013, 'What can be concluded from the noise assessment is that the development will impact in relation to noise as there will be a rise in noise levels from the current ambient noise levels associated with a rural area for many of the houses and sensitive receptors in the general and study area. The level of increase will however be within permitted levels for the most part even in a worst case scenario'.	

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The Consented UWF Substation, will both emit similar levels of noise as the Mountphilips Substation, and the nearest house to the substation is similarly just under 400m (360m) from the Consented UWF Substation and will have no discernible effect on local residents.
Significance of the Impact: Moderate (turbines), No impact (substation)
Rationale for Impact Evaluation: • due to the small magnitude combined with medium sensitivity of receptors according to see Tables 12-11, 12-12 & 12-13 • The very low number of receptors (1) within 400m of the substation, and noise emissions from the operation of the Consented UWF Substation will not be audible above the existing background noise levels. • As per the ABP Inspectors Report (2013): 'What can be concluded from the noise assessment is that the development will impact in relation to noise as there will be a rise in noise levels from the current ambient noise levels associated with a rural area for many of the houses and sensitive receptors in the general and study area. The level of increase will however be within permitted levels for the most part even in a worst case scenario.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.2.2.2.1*
Evaluation of Other Cumulative Impacts– Increase in Ambient Noise Levels
Whole UWF Project Effect
Cumulative Impact Magnitude: None.
Significance of the Cumulative Impact: No Potential for Cumulative Impact
Rationale for Cumulative Impact Evaluation: • due to the separation distance between the operational Mountphilips Substation and the Consented UWF Turbines and Consented UWF Substation

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 12.2.2.2.1).

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12.2.4.4 Impact Evaluation Table: Increase in Ambient EMF Levels

Impact Description	
Project Life Cycle Stage:	Operational Stage

Impact Source: Internal Windfarm Cabling
Cumulative Impact Source: Consented UWF Turbines, Consented UWF Substation, Mountphilips Substation, 110kV UGC (UWF Grid Connection), 220kV Overhead line
Impact Pathway: Air/Ground

Impact Description: There will be some increase in electromagnetic field levels at local residences and community facilities which are within 100m of electrical or communication parts. Electrical or electronical equipment or AIMDs worn by people also has potential to be affected by increased EMF. Details of the modelling of worst case EMF emissions are included in Appendix 12.3 Explanation and Modelling of EMF.

Impact Quality: Negative

Evaluation the Subject Development Impact – Increase in ambient EMF levels

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
There will be some increase in magnetic field levels at the 9 No. of local residences which are within 100m of the Internal Windfarm Cabling. Electrical/electronical equipment in these properties or AIMD worn by residents will also be exposed to increased magnetic field levels. The worst case increased levels of magnetic fields at local residences within 100m ranged from 0.001µT to 1.17µT.

No increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the earth (backfill) materials above the cables

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the Very Low magnitude of the increased magnetic fields level in local residences– the new level of magnetic fields will remain under 1.26µT
- the new levels will be similar to existing ambient levels

Element 2: UWF Related Works – direct/indirect impact

Cumulative Impact Magnitude: Cumulative impacts only relate to 5 No. local residences which are within 100m of both Internal Windfarm Cabling and the 110kV UGC where Internal Windfarm Cabling crosses the L2264-50 public road (and therefore crosses the 110kV UGC) in the Knockmaroe and Knockcurraghbola Crownlands area. Electrical/electronical equipment and AIMDs may also be used/worn at these residences.

The cumulative, worst case increase in magnetic fields will be 0.046 µT, which will increase ambient magnetic fields at the closest local residences to **0.246µT**.

No in combination effects with UWF Grid Connection will occur at any other residence or community facility. There is no potential for cumulative impacts with Upperchurch Windfarm as there are no Consented UWF Turbines located within 100m of a residence or community facility.

There is no potential for Other Projects to cause cumulative effects with UWF Related Works.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

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- EUthe Very Low magnitude of the new magnetic fields level in local residences– the new level of magnetic fields will remain under 1.26µT

the new levels will be similar to existing ambient levels

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

Element 1: UWF Grid Connection

Impact Magnitude: There are no residents or local community facilities within 100m of the Mountphilips Substation. The nearest residential property is 385m distance from the substation - there will no increase in ambient EMF levels at this property.
There will be some increase in magnetic field levels at the 532 No. local residences and 74 No. community facilities which are within 100m of the 110kV UGC. Electrical/electronical equipment in these properties or facilities or AIMD worn by residents/community will also be exposed to increased magnetic field levels.

The increase will be highest at properties/facilities closest to the underground cables and will rapidly reduce with distance from the cabling. The nearest residence is 5m from the 110kV UGC. The nearest community facility (shop) is 5m from the 110kV UGC.

The worst case increase in levels of magnetic fields at local residences and community facilities will range from:
- 4.452µT to 0.132µT for residences/community/businesses between 5m and 30m from the 110kV UGC;
- 0.123µT to 0.047µT for residences/community/businesses between 31m and 50m from the 110kV UGC;
- 0.046µT to 0.01µT for residences/community/businesses between 51m and 100m from the 110kV UGC;

There will be no increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the concrete and backfill materials above the cables.

Significance of the Impact: ranging from Imperceptible to Imperceptible-Slight (110kV UGC) and **No Impact** (Mountphilips Substation),

Rationale for Impact Evaluation:

In relation to the 110kV UGC:

- the Very Low to Low magnitude of increased magnetic fields levels in local residences or community facilities
- the new levels will be similar to existing ambient levels at most locations

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: None

Significance of the Impact: No impact

Rationale for Impact Evaluation:

- No local residents or community within 100m of the Consented UWF Windfarm Substation, or the Consented UWF Turbines.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

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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: Shannonbridge – Killonan 220 kV Overhead Line (existing)

Impact Magnitude: There is 1 No. residence which is within 100m of the 220kV OHL (53m distant). Electrical/electronical equipment and AIMDs may also be used/worn at this residence. The 220kV OHL is currently increasing electric and magnetic field levels, under the worst case scenario, by 300 V/m and 0.98µT.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the Low magnitude of the electric fields level in accordance with Table 12-15
- the Very Low magnitude of the magnetic fields level in accordance with Table 12-16

Evaluation of Other Cumulative Impacts – Increase in ambient EMF levels

Whole UWF Project Effect

Cumulative Impact Magnitude:
In total there are 536 No. local residents or community facilities within 100m of electrical parts associated with the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm Elements of the Whole UWF Project. Electrical/electronical equipment and AIMDs may also be used/worn at these residences, business or community facilities. Worst case increases in magnetic fields will range from 0.01µT to 4.452µT.

There is potential for in-combination effects in Knockmaroe/Knockcurraghbola Crownlands and Knockcurraghbola Commons as outlined at UWF Related Works Cumulative Evaluation above. At these residences the cumulative, worst case increase in magnetic fields will be 0.046µT, which will increase ambient magnetic fields at the closest local residences to **0.246µT**.

Significance of the Cumulative Impact: Imperceptible to Slight

Rationale for Cumulative Impact Evaluation:

- the Very Low to Low magnitude of the new magnetic fields level in local residences– the new worst case level of magnetic fields will be under 4.652µT (this value includes the existing ambient level)

The new levels remain substantially under the EU EMF Limits.

Whole UWF Project Cumulative Evaluation with Other Projects or Activities

Cumulative Impact Magnitude:
Cumulative impacts with Other Projects relates to the combined impact of the 110kV UGC and the existing 220kV OHL. There is 1 No. residence in Coole on the L2166-0 which is within 100m of both projects.
The 110kV UGC will increase magnetic fields at the 1 No. local residence by **0.01 µT.** The worst case in-combination ambient magnetic field levels at the 1 No. local residence would be **0.99µT** (i.e. 0.01 + 0.98). **There is no potential for increased electric fields, as the electric fields from the 110kV UGC will be completely screened**.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- the Very Low magnitude of the cumulative magnetic fields level – the cumulative level of magnetic fields will remain under 1.26µT under the worst case scenario (maximum possible power loads)
- the cumulative level will be similar to the existing contribution from the 220kV OHL

12.2.4.5 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 12-25 below.

Table 12-25: Description and Rationale for Excluded Impacts to Local Residents & Community

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				
All construction works, personnel and activities	1,2,4	Air, Ground	Increase in ambient electromagnetic fields (EMF) levels	Rationale for Excluding: No Potential for Impacts, The Internal Windfarm Cables, Consented UWF Turbines and Consented UWF Substation, Mountphilips Substation, 110kV UGC, will only create electromagnetic fields during the operation of these parts. No EMF will be emitted during the construction stage, therefore this stage is scoped out.
Road opening, rock breaking, earthmoving, operation of machinery and movement of construction traffic along access roads	1, 2, 4	Air, Ground	Vibration damage to buildings or internal nuisance to residents	Rationale for Excluding: Neutral effects, there will be no sources of significant vibration during the construction stage of the UWF Grid Connection or the UWF Related Works, due to any absence of piling and blasting on site. There will be some vibration emissions from road opening, rock breaking and earthmoving activities, though these vibrations will be at a very low level with expected levels of between 0 and 1 mm/s at 10m distance, this is substantially less than the vibration levels of '8mm/s at frequencies of less than 10Hz, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above' below which even cosmetic damage to buildings can be avoided, and below the lower limit for human tolerance of piling of 2.5mm/, therefore vibration effects during the construction stage are scoped out due neutral effects on Local Residents & Community.
Construction Traffic	1,2,4	Wind	Decrease in ambient air quality as a result of traffic derived pollutants (NO2, PM10, PM2.5, CO, Benzene	Rationale for Excluding – Neutral impact: The traffic levels associated with Elements 1, 2, 4 do not reach the criteria outlined in Table 12-4 for carrying out an air modelling assessment for traffic based pollutants as the increase in traffic levels will be less than 1,000 AADT. According to Table 12-7, any small increases in traffic derived pollutants will have a negligible effect in the context of the baseline air quality level of c. 5µg/m^3 (NO2) or 10µg/m^3 (PM10) which is substantially below the objective/limit value of 40µg/m3 for NO2 and PM10.
Operational Stage				
Operational UWF Grid Connection, UWF Related Works and Upperchurch Windfarm	1, 2, 4	Ground	Vibration emissions during the operational stage	Rationale for Excluding: No potential for impacts, there will be no sources of significant vibration during the operational stage of the UWF Grid Connection or the UWF Related Works, due to any absence of piling, blasting, road opening, rock breaking or earthmoving activities. Vibration from operational plant or from operational vehicles using site access roads will be almost impossible to detect, and will not cause damage to buildings or internal nuisance to residents.

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				In relation to the Upperchurch Windfarm, according to the UWF RFI 2013: "The level of vibration from wind turbines is so small that only the most sophisticated instrumentation and data processing can reveal their presence, and they are almost impossible to detect "The level of vibration from wind turbines is so small that only the most sophisticated instrumentation and data processing can reveal their presence, and they are almost impossible to detect".

Decommissioning Stage

Rationale for Excluding: No potential for effects/Neutral effects, as per

UWF Grid Connection: No potential for effects to Air the UWF Grid Connection will not be decommissioned.

UWF Related Works: Decommissioning of the UWF Related Works is limited to the removal of the Telecom Relay Pole and pulling of cables from ducts (Internal Windfarm Cabling) which will take place either from the Consented UWF Turbines or the Consented UWF Substation. **Neutral effect on air quality**, due to the small extent of decommissioning activities with any dust associated occurring within the immediate vicinity of the works areas and limited use of vehicles. **Neutral effect on ambient noise or vibration levels,** due to the distance (greater than 100m) to any local resident or community facility. There will be **Neutral vibration effects**, as the decommissioning activities will not involve any major sources of vibration. There will be **no potential for ambient EMF level increases** as the cables and electrical plant will have been powered down at the start of the Decommissioning Stage and no EMF will be emitted.

Upperchurch Windfarm: It is likely that the Consented UWF Substation will remain in-situ for use by ESBN and that the Concented UWF Roads will also remain in-situ for use by the landowner. Decommissioning works will be mainly limited to the Consented UWF Turbines, Turbine Hardstanding areas, meteorological masts and associated drainage systems, where the turbines and will be removed and the remaining hardstanding areas and associated drainage will be reinstated using the soils in the adjacent storage permanent overburden storage berms, this soil will be reseeded and will re-vegetate quickly, Neutral effects to soils are expected due to the small extent of the hardstands in the context of the large extent of soils in the surrounding area. Upperchurch Windfarm decommissioning works and activities are predominately from turbine hardstands, with works at any one turbine hardstand taking place over c.2 weeks. **Neutral effect on air quality,** due to the small extent of decommissioning activities with any dust associated occurring within the immediate vicinity of the works areas and limited use of vehicles. **Neutral effect on ambient noise or vibration levels,** due to the distance (greater than 100m) to any local resident or community facility. There will be Neutral vibration effects, as the decommissioning activities will not involve any major sources of vibration. There will be **no potential for ambient EMF level increases** as the cables and electrical plant will have been powered down at the start of the Decommissioning Stage and no EMF will be emitted.

12.2.5 Mitigation Measures for Impacts to Local Residents & Community

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 Local Residents & Community as a consequence of the UWF Related Works.

12.2.6 Evaluation of Residual Impacts to Local Residents & Community

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures were required, and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Local Residents & Community above (Section 12.2.4) – i.e. **no significant adverse impacts**.

12.2.7 Application of Best Practice and the EMP for Local Residents & Community

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 **Local Residents & Community,** by the authors of this topic chapter, using industry best practice:

RW-BPM-29	Minimising Dust Emissions From Site Activities
RW-BPM-31	Measuring Operational EMF Emissions

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

12.2.8 Summary of Impacts to Local Residents & Community

A summary of the Impact to Local Residents & Community is presented in Table 12-26.

Table 12-26: Summary of the impacts to Local Residents & Community

Impact to Local Residents & Community:	**Increase in Airborne Dust**	**Increase in Ambient Noise Levels**	**Increase in Ambient Noise Levels**	**Increase in Ambient EMF Levels**
Evaluation Impact Table	*Section 12.2.4.1*	*Section 12.2.4.2*	*Section 12.2.4.3*	*Section 12.2.4.4*
Project Life-Cycle Stage	Construction	Construction	Operational Stage	Operational Stage
UWF Related Works *(direct/indirect impact)*	**Slight**	**Moderate**	**No Potential for Impact**	**Imperceptible**
UWF Related Works *Cumulative Impacts*	**Slight**	**Moderate**	**No Potential for Cumulative Impact**	**Imperceptible**
Element 1: UWF Grid Connection	Slight	Moderate	No Impact	Imperceptible
Element 3: UWF Replacement Forestry	Neutral Impacts or No Impacts	Evaluated as Excluded, see Section 12.2.2.2.1		
Element 4: Upperchurch Windfarm	No significant Impact	Not be Significant	Moderate	No Impact
Element 5: UWF Other Activities	Neutral Impacts or No Impacts	Evaluated as Excluded, see Section 12.2.2.2.1		
Other Cumulative Impact:				
Whole UWF Project Effect	**Slight**	**Moderate**	**No Potential for Cumulative Impact**	**Imperceptible**
All Other Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Shannonbridge – Killonan 220kV OHL	No Potential for Impact - Evaluated as Excluded, see Section 12.2.2.2.1			**Imperceptible**

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

(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).

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12.3 Sensitive Aspect No.2: Transient People

This Section provides a description and evaluation of the Sensitive Aspect - Transient People.

12.3.1 BASELINE CHARACTERISTICS of Transient People

12.3.1.1 STUDY AREA for Transient People

The study area for Transient People in relation to the UWF Related Works is described in Table 12-27 and illustrated on Figure RW 12.3: Transient People within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 12-27: UWF Related Works Study Area for Transient People

Study Area for Transient People	Justification for the Study Area Extents
Construction Stage Air Quality, Noise and Vibration: Lands, roads and waymarked walking trails within 350m of construction works areas & within 50m of main transport routes used by construction vehicles	Based on Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, and the Guidance on the Assessment of Dust from Demolition and Construction. Based on the Guidelines for the Treatment of Noise and Vibration in National Road Schemes, the Guidelines recommend that receptors within 300m of a route be identified, however in the interest of simplicity, the wider Air Quality study area of 350m from construction works is used in the appraisal.
Operational Stage EMF: Lands, roads and waymarked walking trails within 100m from Internal Windfarm Cabling.	Based on professional judgement, EMF Field emissions can extend to this distance. At distances greater than 100m, the contribution of the Internal Windfarm Cabling to ambient EMF levels will be extremely low or none, with effects being considered neutral or none

12.3.1.2 Baseline Context and Character of Transient People in the UWF Related Works Study Area

Transient People relate to farm/forestry workers and walkers/cyclists who may be pass by or momentarily/briefly come within 350m of construction works areas or within 50m of haul routes associated with the project, or within 100m of operational electrical plant, such as underground cables and substations.

Air Quality: Any transient people present within the UWF Related Works Study Area, will be within an EPA Air Quality Monitoring Zone D area. Overall, there is a good air quality baseline for the area. Background levels of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) in this area are substantially below the EU limit values.

Noise & Vibration: The study area is an area with low background noise, with no significant sources of noise. There are no significant sources of vibration in the area either.

Note: Drivers of motorised vehicles are not considered sensitive to either noise or air quality, due to the emission of noise and air pollutants by vehicles and the enclosure of the driver and passengers inside the vehicle.

EMF: Along walking trails and roads, and in fields and forestry, the existing levels of Magnetic field are likely to be less than 0.2 µT at a distance of 30 m away from existing electric infrastructure such as a 38kV line and up to 4µT directly underneath medium voltage overhead lines.

EMF – Electronic Equipment: Artificial Implantable Medical Devices (AIMDs) such as pacemakers which could be worn by transient people on roads, lands and walking routes within 100m of the electrical and communication equipment associated with the UWF Related Works. Electronic equipment in machinery and

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vehicles on farmland, forestry and public roads are excluded from further evaluation as they are not commonly susceptible to 50 Hz magnetic fields.

The location of transient people within the UWF Grid Connection Study Area identified in Table 12-28. Table

Table 12-28: Transient People within the UWF Related Works Study Areas

Project	Transient People within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Transient People within 50m of Materials Haulage Routes (Air Quality)	Transient People within 100m Of Electrical Parts (EMF)
UWF Related Works	• Farm and forestry workers on lands within 350m of construction works areas, • Walkers/cyclists on roads within 350m of the 9 No. road crossing locations • Walkers/cyclists on those parts of the Eamonn a Chnoic Loop or Ormond Way Walking Route, or Ormond Way Cycle Route, within 350m of construction works areas	Walkers/cyclists on material haulage routes on the following local roads: L-4139-0, L-4139-16, L-2264-50, L2264-34, L-6188-0, L-61881-0 and L-6185-13.	• Farm and forestry workers on lands within 100m of the Internal Windfarm Cabling. • A road users within 100m of the 9 No. Internal Windfarm Cabling crossing locations • Walkers/cyclists on those parts of the Eamonn a Chnoic Loop or Ormond Way Walking Route, or Ormond Way Cycle Route, which are within 100m of the Internal Windfarm Cabling.

12.3.1.3 Importance of Air (Transient People)

Users of the walking trails in the area expect a high level of amenity and enjoyment. Farm and forestry workers spend the majority of their working day outdoors.

There is a reasonable expectation from all types of transient people for a good level of air quality, and low ambient noise and EMF levels in rural upland areas of Ireland which are remote from busy, congested roads and industrial sources of air pollutants, noise and vibration.

Artificial Implantable Medical Devices (AIMDs) which may be worn by Transient People, such as pacemakers are tested to higher EMF Immunity levels to safeguard operation according to EU regulations (CENELEC 50527-1:2010). A limit of 100 µT applies to 50 Hz magnetic fields and 5000 V/m to 50 Hz electric fields. It should be noted that these are the same limits as the ICNIRP limits adopted by the EU for the general public and used in this chapter of the EIA Report.

12.3.1.4 Sensitivity of Transient People

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Air Quality: Areas of transient human exposure are considered to be of **low** sensitivity (see Table 12-5). Based on the receptor sensitivity (**low**), the number of receptors (assessed as **'1 or more'** from Tables 12-6 and 12-7) and their distance from the source (**less than 50 m** in worst-case locations), and the assumption based on EPA monitoring that annual mean background level of PM_{10}, are well below the objective limit and substantially less than 24 µg/m^3, it is considered that sensitivity of transient people to dust soiling or human health effects is considered '**Low**' under the IAQM assessment guidance.

Noise & Vibration: Road users and farm/forestry workers are not considered noise sensitive receptors given their proximity to vehicle, machinery and animals. Construction workers are not sensitive receptors. According to the IEMA 2014 Guidelines, other transient people – walkers and cyclists on waymarked trails - are considered to have a low sensitivity to noise effects.

EMF: Transient People such as farm workers, walkers or road users do not fall under the ICNIRP guideline exposure limits as their time spent in close proximity to the operational Whole UWF Project will typically be limited to momentary or brief periods of time. However, in this EIA Report chapter, any increases in EMF levels, to which Transient People will be exposed, are also evaluated against the 1998 ICNIRP limits. A substantial increase in EMF levels above EU electric and electronic equipment Immunity test levels could cause the malfunction of equipment

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

Air Quality: If the works do not proceed, the baseline levels of dust including PM_{10} and $PM_{2.5}$ are likely to remain at existing levels. In Ireland the primary sources of Particulate Matter (PM_{10} and $PM_{2.5}$) are vehicular emissions and burning of solid fuels for heating. Due to the nature of the area (remotely populated with no congested roads) PM emissions are unlikely to change dramatically in future years. Small fluctuations are likely in line with previous trends.

Noise: With the exception of Milestone Windfarm which was constructed in 2018 and located on lands in close proximity to UWF Related Works, there have been no increases or decreases in sources of background noise in the local area. The trend of wind energy development in the area will continue with the construction of the Consented Upperchurch Windfarm.

EMF: Electrical and electronic equipment and radio frequency technology will increasingly become more present in everyday life; the expansion of the power infrastructure in the country is also expected albeit at a much slower rate; however government regulations will ensure EMF levels remain significantly lower than the ICNIRP standard limits.

12.3.1.6 Receiving Environment (the Baseline + Trends)

Air Quality: There are no specific future trends for construction dust emissions in the area of the Whole UWF Project. It is assumed that in relation to dust, the receiving environment will be similar to the baseline environment.

Noise: The receiving environment at the time of construction will include the Milestone Windfarm as part of baseline noise sources, but will not include operational Consented UWF Turbines.

EMF: A continued adoption of electrical and electronic infrastructure and equipment, will increase the background level of EMF at a very slow rate over time. It is not expected for EMF levels to increase significantly above existing average levels of 10V/m or 0.2µT and the receiving environment during the operational stage is assumed to be similar to the baseline environment identified above.

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12.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

12.3.2.1 Cumulative Evaluation Study Area

12.3.2.1.1 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 Transient People	Justification for the Study Area Extents
Air Quality, Noise & Vibration: Lands, roads and waymarked walking trails within 350m from UWF Related Works construction works areas and within 50m from UWF Related Works main transport routes, and EMF: Lands, roads and waymarked walking trails within 100m of UWF Related Works electrical and communication equipment.	Based on Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, Guidance on the Assessment of Dust from Demolition and Construction, and Guidelines for the Treatment of Noise and Vibration in National Road Schemes, EMF - professional judgement. No potential for cumulative operational noise due to separation distance between the sources of Whole UWF Project noise.

The study is illustrated on Figure CE 12.3: Transient People within the UWF Related Works Cumulative Evaluation Study Area.

12.3.2.1.2 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 12.3.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements as described in Table 12-29 and illustrated on Figure WP 12.3: Transient People within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 12-29: Whole Project Cumulative Evaluation Study Area for Transient People

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Air Quality, Noise & Vibration: Lands, roads and waymarked walking trails within 350m from construction works areas and within 50m from main transport routes, and EMF: Lands, roads and waymarked walking trails within 100m of Whole UWF Project	Based on Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, Guidance on the Assessment of Dust from Demolition and Construction, and Guidelines for the Treatment of Noise and Vibration in National Road Schemes, EMF - professional judgement.
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		

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Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 5: UWF Other Activities	electrical and communication equipment.	No potential for cumulative operational noise due to separation distance between the sources of Whole UWF Project noise.

12.3.2.2 Scoping for Other Projects or Activity & Potential for Impacts

The evaluation of cumulative impacts to Transient People 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 Transient People 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 A2.3.2.12).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Transient People with UWF Related Works however in order to present the totality of the project – the existing Shannonbridge – Killonan 220 kV OHL and the existing Killonan – Nenagh 110kV OHL have been scoped in for evaluation of cumulative effects relating to the Other Elements.

The location of the Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure WP 12.3.

12.3.2.2.1 Potential for Other Elements or Other Projects to cause Transient People

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 Transient People. The results of this evaluation are included in Table 12-30. The baseline character of the areas around these projects is described in Section 12.3.2.3.

Table 12-30: 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	Evaluated as excluded: Neutral Impacts or No Impacts due to • The planting of the new woodland will have a neutral impact on air quality as works will be carried out by hand using spades, with use of vehicles limited to personnel vehicles and negligible traffic volumes associated with the planting stage. • No potential for adverse air quality impacts during the growth stage, due to the absence of dust creating activities and negligible traffic volumes. • There is no potential for noise or vibration effects, as there will be no sources of mechanical noise or vibration because planting will be carried out by hand (Project Design Measure) in grassland fields. • During the growth stage, chainsaws may be used during thinning activities, however this type of activity will be infrequent, brief in nature and at a distance from local residents, therefore it is considered that

	noise related impacts will be neutral during any thinning activities during the growth stage. • There is no potential for impacts due to EMF emissions as there are no electrical or radio-communication parts associated with the UWF Replacement Forestry.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral Impacts or No Impacts due to: • Neutral effect on Air Quality - any activities will be of a very short duration, minimal extent and will involve minimal use of vehicles or equipment. • Neutral effect on ambient noise or vibration levels due to the momentary to brief duration of activities at any one location, and the generally low-medium noise levels of the equipment used. Equipment which will be used includes a hedge cutter, tractor, vans, and cable-pullers and hand tools. Activities will take between 15 minutes and 2 days to complete at the various locations Specifically in relation to Haul Route Activities, any noise or vibration emitted by machinery or vehicles used will be in the context of background noise and vibration from regional or national roads, or will not be noticeable in the context of local traffic and farming activity. . • No potential for increases in ambient EMF levels, as there are no electrical or radio-communication parts associated with the Overhead Line Activities.
Other Projects or Activities	
Shannonbridge – Killonan 220 kV OHL; Killonan – Nenagh 110kV OHL	Yes, included for the evaluation of cumulative effects **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.

12.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

Air Quality: Any transient people present within the Cumulative Evaluation Study Area, will be within an EPA Air Quality Monitoring Zone D area. Overall, there is a good air quality baseline for the area. Background levels of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) in this area are substantially below the EU limit values.

Noise & Vibration: The study area is considered to be an area with low background noise, with no significant sources of noise. There are no significant sources of vibration in the area either.

EMF: Along walking trails and roads, and in fields and forestry, the existing levels of Magnetic field are likely to be less than 0.2 µT at a distance of 30 m away from existing electric infrastructure such as a 38kV line and up to 4µT directly underneath medium voltage overhead lines.

The potential locations where Transient People may be present within the Cumulative Evaluation Study Areas are illustrated on Figure WP 12.3.

12.3.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

Table 12-31: Transient People within the UWF Grid Connection Study Areas

Project	Transient People within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Transient People within 50m of Materials Haulage Routes (Air Quality)	Transient People within 100m Of Electrical Parts (EMF)
UWF Grid Connection	• Walkers/cyclists on roads along the 110kV UGC or on those parts of the Slievefelim Way and Ormond Way Cycle Route within 350m of the 110kV UGC • Farm and forestry workers on lands within 350m of construction works areas,	Walkers/cyclists on material haulage routes on the following roads L2166-0, R503, L2264-50 and L6166-0.	• All road users on L2166-0, R503, L2264-50 and L6166-0 within 100m of the 110kV UGC • Walkers/cyclists on those parts of the Slievefelim Way and Ormond Way Cycle Route within 100m of the 110kV UGC • Farm and forestry workers on lands within 100m of the Mountphilips Substation and/or the 110kV UGC.

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Knockmaroe, Knockcurraghbola Commons, and Knockcurraghbola Crownlands where the 110kV UGC is located the public roads L2264-50 and L-6188-0 and along the private road to the Consented UWF Substation. The Ormond Way Cycle Route is within the study area, being routed along the L2264-50.

12.3.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 12.3.2.2.1

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12.3.2.3.1 Element 4: Upperchurch Windfarm

Table 12-32: Transient People within the UWF Grid Connection Study Areas

Project	Transient People within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Transient People within 50m of Materials Haulage Routes (Air Quality)	Transient People within 100m Of Electrical Parts (EMF)
Upperchurch Windfarm	• Walkers/cyclists on roads within 350m of the 11 no. site entrances, • Walkers/cyclists on those parts of the Eamonn a Chnoic Loop, Ormond Way Cycle or Ormond Way Walking Route, within 350m of construction works areas • Farm and forestry workers on lands within 350m of construction works areas	Walkers/cyclists on material haulage routes on the following local roads: L-4139-0, L-4138-12, L-2264-50, L-6188-0, L-61881-0 and L-6185-13.	Farm and forestry workers and walkers on lands within 100m of the Consented UWF Substation and Consented UWF Turbines.

Consideration of the Passage of Time: The Ormond Way Cycle Route has been developed since the 2013 planning application, and the Ormond Way Walking Route is currently under development. The cycle route passes construction works areas in Knockmaroe. The preliminary route of the Ormond Way Walking similar to the Eamonn a Chnoic is partially routed through the windfarm. The evaluations in this Revised EIAR take account of these additional waymarked trails.

12.3.2.3.2 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 12.3.2.2.1

12.3.2.3.3 Other Projects or Activities

Farm or forestry workers or road users may be present within 100m of both the UWF Grid Connection and the Shannonbridge – Killonan 220kV OHL or the Killonan – Nenagh 110kV OHL.

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.

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12.3.3 PROJECT DESIGN MEASURES for Transient People

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.

There are no Project Design Environmental Protection Measures specific to Transient People.

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12.3.4 EVALUATION OF IMPACTS to Transient People

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.

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

Table 12-33: 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)***
Increase in ambient EMF levels (Operational Stage)	*Increase in ambient electromagnetic fields (EMF) levels (construction stage)*
	Vibration damage to buildings or internal nuisance to residents (construction stage)
	Decrease in ambient air quality as a result of traffic derived pollutants (NO_2, PM_{10}, $PM_{2.5}$, CO, Benzene) (construction stage)
	Increase in Airborne Dust (construction stage)
	Increase in ambient noise levels (construction stage)
	Increase in ambient noise levels (operational stage)
	Vibration emissions during the operational stage (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 12.3.4.1 to 12.3.4.2.**

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 12.3.4.3..

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12.3.4.1 Impact Evaluation Table: Increase in Ambient EMF Levels

Impact Description	
Project Life Cycle Stage:	Operational stage

Impact Source: Internal Windfarm Cabling (UWF Related Works),
Cumulative Impact Source: Mountphilips Substation, 110kV UGC (UWF Grid Connection), 110kV Overhead line, 220kV Overhead line, Internal windfarm cabling
Impact Pathway: Air/Ground

Impact Description: There will be some increase in electromagnetic field levels in locations which are within 100m of electrical or communication parts. AIMDs worn by people also has potential to be affected by increased EMF. Details of the modelling of worst case EMF emissions are included in Appendix 12.3 Explanation and Modelling of EMF.

Impact Quality: Negative

Evaluation the Subject Development Impact – Increase in ambient EMF levels

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude: Any farm or forestry works, walkers and cyclists, or road users on public roads within 100m of the operational Internal Windfarm Cables will be exposed to increased magnetic field levels. AIMD worn by Transient People will also be exposed to increased magnetic field levels. The worst case levels of magnetic field will be directly over the Internal Windfarm Cables and will be 7.6 µT. Levels of EMF drop off quickly with distance and at 30m of the Internal Windfarm Cable, the worst case magnetic field levels will be 0.03 µT.

No increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the earth (backfill) materials above the cables.
Magnitude Result: Very Low

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the Very Low magnitude of the increased magnetic fields of 7.6µT
- No increase in electric fields
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure
- the reversibility of the exposure as the person moves away from the location of the underground cables

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: Cumulative impacts only relate to public roads, waymarked cycle routes, waymarked walking routes, and agricultural and forestry lands (where farm and forestry workers may be present) which are

- within 100m of both Internal Windfarm Cabling and UWF Grid Connection 110kV UGC in Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons, where the worst case levels will be 55.8 µT directly over the two trenches; or
- within 100m of both Internal Windfarm Cabling and Consented UWF Turbines on the Upperchurch Windfarm site, where the worst case levels will be 7.8 µT in close proximity to the turbines; or
- within 100m of Internal Windfarm Cabling and 110kV UGC and Consented UWF Substation, in Knockcurraghbola Commons, where worst case cumulative increases in ambient magnetic fields will be 1µT in close proximity to both underground cables and near the substation fence.

AIMD worn by Transient People will also be exposed to increased magnetic field levels
There is no potential for Other Projects or Activities to cause cumulative effects with UWF Related Works.

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Significance of the Cumulative Impact: ranging from Imperceptible to Slight

Rationale for Cumulative Impact Evaluation:

- the Medium magnitude of the increased magnetic fields which will be greatest above the 110kV UGC and Internal Windfarm Cable, of 55.8µT.
- the Low magnitude of the increased magnetic fields beside the Consented UWF Turbines and over an internal windfarm cable of 7.8 µT
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure,
- the reversibility of the exposure as the person moves away from the location of the underground cables, turbines or substation.

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

Element 1: UWF Grid Connection

Impact Magnitude:
Mountphilips Substation: Any farm or forestry workers present within 100m of the Mountphilips Substation will be exposed to increased ambient electric and magnetic fields levels within 100m of the substation, which were modelled as 40V/m and 1µT under worst case scenario conditions at the substation fence. AIMD worn by Transient People will also be exposed to increased magnetic field levels.
110kV UGC: Any farm or forestry works, walkers, cyclists on/users of waymarked trails (Slievefelim Way and Ormond Way Cycle), or road users on public roads within 100m of the 110kV UGC will be exposed to increased magnetic field levels. AIMD worn by Transient People will also be exposed to increased magnetic field levels. The worst case levels of 54µT magnetic field will be directly over the 110kV. Levels of EMF drop off quickly with distance and at 5m, 10m, 25m and 50m from the 110kV UGC, the worst case magnetic field levels will be 4.452µT, 1.16 µT ,0.19µT and 0.047µT, respectively.
110kV UGC: No increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the concrete and earth (backfill) materials above the cables.
Magnitude Result: Low & Very Low

Significance of the Impact: ranging from Imperceptible to slight

Rationale for Impact Evaluation:

- The Low magnitude of the worst-case increased electric fields of 40V/m at the Mountphilips Substation
- the Very Low magnitude of the increased magnetic fields of 1µT at the Mountphilips Substation
- the Medium magnitude of the increased magnetic fields above the 110kV UGC, of 54µT.
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure
- the reversibility of the exposure as the person moves away from the location of the underground cables

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.3.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude:
Consented UWF Substation: Any farm or forestry workers present within 100m of the Consented UWF Substation will be exposed to increased ambient electric and magnetic fields levels, which were modelled as 40V/m and 1µT under worst case scenario conditions. AIMD worn by Transient People will also be exposed to increased magnetic field levels.
Consented UWF Turbines: Any farm or forestry workers, walkers on/users of waymarked trails (Ormond Way Walking trail and Eamonn a Chnoic Loop) present within 5m of the Consented UWF Turbines will be exposed to increased ambient magnetic fields levels, which were researched and calculated as 0.2 µT under worst case scenario conditions.
Magnitude Result: Very Low, Low

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Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The Low magnitude of the worst-case increased electric fields of 40V/m at the Consented UWF Substation,
- the Very Low magnitude of the increased magnetic fields of 1µT at the Consented UWF Substation
- the Very Low magnitude of the increased magnetic fields beside the Consented UWF Turbines of 0.2µT
- the momentary to brief exposure of any transient people present
- the reversibility of the exposure as the person moves away from the location of the underground cable

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.3.2.2.1*

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: Shannonbridge – Killonan 220 kV OHL

Impact Magnitude: Any farm workers within 100m of the existing overhead lines will be exposed to increased magnetic and electric field levels. The worst case levels associated with this OHL will be directly underneath the 220kV lines, with worst case magnetic fields of 25.7 µT and electric fields of 3.5 kV/m in relation to the 220kV OHL.
Magnitude Result: Medium

Significance of the Impact: Imperceptible to Slight

Rationale for Impact Evaluation:

- the Medium magnitude of the existing magnetic and electric fields of 25.7 µT and 3.5 kV/m
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure

Other Project: Killonan – Nenagh 110kV OHL

Impact Magnitude: Any farm workers within 100m of the existing overhead lines will be exposed to increased magnetic and electric field levels. The worst case levels associated with this OHL will be directly underneath the 110kV lines, with worst case magnetic fields of 15 µT and electric fields of 1.3 kV/m.
Magnitude Result: Medium

Significance of the Impact: Imperceptible to Slight

Rationale for Impact Evaluation:

- the Medium magnitude of the existing magnetic and electric fields of 15 µT and 1.3 kV/m
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure

Evaluation of Other Cumulative Impacts – Increase in ambient EMF levels

Whole UWF Project Effect

Cumulative Impact Magnitude:
The extent of the whole project impact is the increase in ambient EMF at both substations, over/close to110kV underground cables, Internal windfarm cables, and also at Consent UWF Turbine locations. Any farm or forestry works, or walkers or cyclists on waymarked trails will be exposed to increased levels of EMF. AIMD worn by Transient People will also be exposed to increased magnetic field levels.

The worst case possible increases in ambient electric and magnetic fields levels of 40V/m and 1µT under worse case scenario conditions at the substation fences, increases of 54µT in magnetic fields directly over the 110kV

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UGC, 7.6 µT increases in magnetic fields directly over the Internal Windfarm Cabling, and 0.2 µT increases in magnetic fields right beside the turbine bases.

The worst case in-combination effect will be directly over the 110kV UGC and Internal Windfarm Cabling trenches, which are located in the same area in Knockmaroe (on the L2264-50), and on the private road in Knockcurraghbola Crownlands near the Consented UWF Substation, where worst case levels will be 55.8 µT. No in combination effects of Elements of the Whole UWF Project will occur at any other location and any increases in electric or magnetic fields will be as described above.

Magnitude Result: Very Low, Low, Medium

Significance of the Cumulative Impact: ranging from **Imperceptible to Slight** for people**, Slight** for AIMDs

Rationale for Cumulative Impact Evaluation:

- The Low magnitude of the worst-case increased electric fields of 40V/m at the 110kV substations
- the Very Low magnitude of the increased magnetic fields of 1µT at the 110kV substations
- the Medium magnitude of the increased magnetic fields above the 110kV UGC and Internal Windfarm Cable, of 55.8µT.
- the Low magnitude of the increased magnetic fields beside the Consented UWF Turbines and over an internal windfarm cable of 7.8 µT
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure,
- the reversibility of the exposure as the person moves away from the location of the underground cables.

Whole UWF Project Cumulative Evaluation with Other Projects or Activities

Cumulative Impact Magnitude: Cumulative impacts with Other Projects only relates to UWF Grid Connection.

110kV UGC and 220kV OHL or 110kV OHL:
The worst case combination ambient magnetic field levels for transient people which are within 100m of both the 110kV UGC and the 110kV OHL **or** within 100m of both the 110kV UGC and the 220kV OHL would be 69µT and 79.7µT respectively, at the points directly above the 110kV UGC and directly under the OHLs.

On the local road, which is passes under the 220kV OHL, the worst case levels are 25.7µT magnetic field and 3.5 kV/m electric field, but this point is greater than 100m from the 110kV UGC, and the 110kV UGC will not contribute to increased magnetic fields at this location.

There are no cumulative electric field levels as the 110 kV UGC does not contribute to the ambient Electric field. There is also no cumulative associated with the electrical equipment in the Mountphilips Substation compound, as the compound is greater than 100m from either the 110kV or 220kV OHLs.

Significance of the Cumulative Impact: ranging from **Imperceptible to Slight** for people, **Slight** for AIMDs

Rationale for Cumulative Impact Evaluation:

- the Medium cumulative magnitude of magnetic fields at Mountphilips of 69 µT and 79.7 µT under the 110kV OHL and the 220kV OHL, respectively
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure
- the reversibility of the exposure as the person moves away from the location of substations and the underground cables or overhead lines.

Air

Topic

12.3.4.2 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 12-34 below.

Table 12-34: Description and Rationale for Excluded Impacts to Transient People

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				
All construction works, personnel and activities	1,2,4	Air, Ground	Increase in ambient electromagnetic fields (EMF) levels	Rationale for Excluding: No Potential for Impacts, the Mountphilips Substation, 110kV UGC, Internal Windfarm Cables, Consented UWF Turbines and Consented UWF Substation will only create electromagnetic fields during the operation of these parts. No EMF will be emitted during the construction stage.
Road opening, rock breaking, earthmoving, operation of machinery and movement of construction traffic along access roads	1, 2, 4	Air, Ground	Vibration emissions	Rationale for Excluding: No Potential for Impacts, transient people are not considered sensitive to vibration emissions at the levels which could be emitted during construction works and by construction machinery.
Construction Traffic	1,2,4	Wind	Decrease in ambient air quality as a result of traffic derived pollutants (NO_2, PM_{10}, $PM_{2.5}$, CO, Benzene	Rationale for Excluding: Neutral impact, the traffic levels associated with the Elements of the Whole UWF Project do not reach the criteria outlined in Table 12-4 for carrying out an air modelling assessment for traffic based pollutants as the neither the individual nor in-combination increase in traffic levels will be less than 1,000 AADT. According to Table 12-7, any small increases in traffic derived pollutants will have a negligible effect in the context of the baseline air quality level of c. 5µg/m^3 (NO_2) or 10µg/m^3 (PM_{10}) which is substantially below the objective/limit value of 40µg/m^3 for NO_2 and PM_{10}.
Delivery of construction materials Excavation and storage of materials	1, 2, 4	Wind	Increase in airborne dust	Rationale for Excluding: Neutral impact, due to a Low receptor sensitivity, a Low sensitivity of the area (of walking routes, public roads or agricultural/forestry lands), combined with the medium magnitude of construction activities, it is considered that the risk of dust effects to Transient People is Low, furthermore the duration of any effects will be momentary to brief in duration.
Delivery of construction materials Excavation and storage of materials	1, 2, 4	Wind	Increase in ambient noise levels	Rationale for Excluding: Neutral impact, as per the IEMA 2014 transient people are considered to have a Low sensitivity to noise effect, any walkers or cyclists will only momentarily encounter construction works at four locations where waymarked trails come into close proximity with construction works areas. In

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				addition, there will be no unauthorized access by transient people to construction works areas.
Operational Stage				
Operational substations, operational turbines	1,4	Air	Increase in ambient noise levels	Rationale for Excluding: no potential for impacts/Neutral impacts: once constructed, noise emissions from the operational Mountphilips Substation or the Consented UWF Substation will not be audible at distances beyond 200m. As there are no waymarked trails within this distance, there is no potential for impacts to Transient People (Road users and farm/forestry workers are not considered noise sensitive receptors given their proximity to vehicle, machinery and animals). The Eamonn a Chnoic Loop is routed in close proximity to turbines in Knocknamena, however it is considered that while the noise emitted by the turbines will be heard in close proximity, this noise will not be intrusive – the levels will not cause any change in behaviour, such as having to speak more loudly as a conversation can be carried out normally while standing underneath a turbine. In the context of the momentary/brief duration of any effects, it is considered that the noise emitted by the Consented Upperchurch Turbines will have a neutral effect on any walkers that may be on this looped walk.
Operational UWF Grid Connection, UWF Related Works and Upperchurch Windfarm	1, 2, 4	Ground	Vibration emissions during the operational stage	Rationale for Excluding**:** No potential for impacts, there will be no sources of significant vibration during the operational stage of the UWF Grid Connection or the UWF Related Works, due to any absence of piling, blasting, road opening, rock breaking or earthmoving activities. Vibration from operational plant or from operational vehicles using site access roads will be almost impossible to detect. In relation to the Upperchurch Windfarm, according to the UWF RFI 2013: "The level of vibration from wind turbines is so small that only the most sophisticated instrumentation and data processing can reveal their presence, and they are almost impossible to detect
Decommissioning Stage				
Rationale for Excluding: No potential for effects/Neutral effects: UWF Grid Connection: No potential for effects to Air: The UWF Grid Connection will not be decommissioned and therefore there is no potential for effects to air quality or to ambient noise, vibration or EMF levels. UWF Related Works: Decommissioning of the UWF Related Works is limited to the removal of the Telecom Relay Pole and pulling of cables from ducts (Internal Windfarm Cabling) which will take place either from the Consented UWF Turbines or the Consented UWF Substation. Neutral effect on air quality, due to the small extent of decommissioning activities with any dust associated occurring within the immediate vicinity of the works areas and limited use of vehicles. Neutral effect on ambient noise or vibration levels, due to momentary to brief duration of any increase in ambient noise experience by any walkers that may be presented on the Eamonn a Chnoic Loop or Ormond Way (if developed) where they comes in close proximity to the Upperchurch Windfarm. There will be Neutral vibration effects, as the decommissioning activities will not involve any major sources of vibration. No potential for impact ambient EMF levels: no EMF will be emitted as the cables and electrical plant will have been powered down at the start of the Decommissioning Stage.				

Air

Topic

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Upperchurch Windfarm; Neutral impact –It is likely that the Consented UWF Substation will remain in-situ for use by ESBN, decommissioning works will be limited to the Consented UWF Turbines, turbine hardstanding areas, meteorological masts and associated drainage systems, where the turbines and will be removed and the remaining hardstanding areas and associated drainage will be reinstated using the soils in the adjacent storage permanent overburden storage berms, this soil will be reseeded and will re-vegetate quickly, Neutral effects to soils are expected due to the small extent of the hardstands in the context of the large extent of soils in the surrounding area. Upperchurch Windfarm decommissioning works and activities are predominately from turbine hardstands, with works at any one turbine hardstand taking place over c.2 weeks. Neutral effect on Air Quality, due to the small extent of decommissioning activities with any dust associated occurring within the immediate vicinity of the works areas and limited use of vehicles. Neutral effect on ambient noise or vibration levels**,** due to the momentary to brief duration of any increase in ambient noise experience by any walkers that may be presented on the Eamonn a Chnoic Loop or Ormond Way where they comes in close proximity to the Upperchurch Windfarm. There will be Neutral vibration effects, as the decommissioning activities will not involve any major sources of vibration. No potential for impact ambient EMF levels: no EMF will be emitted as the cables and electrical plant will have been powered down at the start of the Decommissioning Stage.				

12.3.5 Mitigation Measures for Impacts to Transient People

Mitigation measures were incorporated into the UWF Related Works project design. No additional mitigation measures are required as **no significant adverse impacts** are concluded by the topic authors as likely to occur to Transient People as a consequence of the UWF Related Works.

12.3.6 Evaluation of Residual Impacts to Transient People

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures were required, and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Transient People above (Section 12.3.4) – i.e. **no significant adverse impacts**.

12.3.7 Application of Best Practice and the EMP for Transient People

No UWF Related Works Best Practice Measures have been developed specifically for Transient People.

12.3.8 Summary of Impacts to Transient People

A summary of the Impact to Transient People is presented in Table 12-35.

Table 12-35: Summary of the impacts to Transient People

Impact to Transient People:	**Increase in Ambient EMF Levels**
Evaluation Impact Table	*Section 12.3.4.1*
Project Life-Cycle Stage	Operational Stage
UWF Related Works (direct & indirect impacts)	**Imperceptible**
UWF Related Works Cumulative Impacts	**Imperceptible to Slight**
Element 1: UWF Grid Connection	Imperceptible to Slight
Element 3: UWF Replacement Forestry	Neutral or No Impacts- Evaluated as Excluded, see Section 12.3.2.2.1
Element 4: Upperchurch Windfarm	Imperceptible
Element 5: UWF Other Activities	No Potential for Impact- Evaluated as Excluded, see Section 12.3.2.2.1
Other Cumulative Impacts:	
Whole UWF Project Effect	**Imperceptible to Slight**
Whole UWF Project cumulatively with Other Projects Shannonbridge – Killonan 220 kV OHL; Killonan – Nenagh 110kV OHL	**Imperceptible to Slight**

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

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Air

Topic

12.4 Policy Context

12.4.1 National Policy

Air Quality Standards were established under EU Directive 2008/50/EC which sets limit values for certain air pollutants in order to protect against human health impacts. These limit values or "Air Quality Standards" are included in Appendix 12.1: Air Quality Monitoring & Standards.

Noise: National Noise Policy is driven by the Environmental Noise Directive (END), EC 2002/49/EC. The Environmental Noise Directive was transposed into Irish Law as Statutory Instrument, S.I. 1401 of 2006, Environmental Noise Regulation 2006. The Directive requires Member States to prepare and publish, every 5 years, noise maps and noise management action plans. The aim of then END is to provide a common framework to avoid, prevent or reduce, on a prioritised basis, the harmful effects of exposure to environmental noise through the preparation of strategic noise maps and the development and implementation of action plans.

EMF: The Irish Government and the European Union have adopted the ICNIRP 1998 Guidelines for EMF exposure. The Irish Government Department of Communications, Marine and Natural Resources have stated "No adverse Health effects have been established below the limits suggested by international guidelines. Electrical and Electronic equipment in Ireland is tested against Immunity levels required by EU legislation (EMC Directive 2013/30/EU

12.4.2 Regional Policy

No specific policies in relation to Air Quality, Noise, Vibration or EMF.

12.4.3 North Tipperary County Development Plan 2010 (as varied):

There are no specific Air Quality or EMF objectives within the North Tipperary County Development Plan.

In relation to Noise, Policy TI12: Noise Emissions, states: *It is the policy of the Council to ensure that new development does not result in significant noise disturbance and to ensure that all new developments are designed and constructed to minimise noise disturbance in accordance with the provisions of the Noise Action Plan 2013, the Development Management Standards set out in Chapter 10 and relevant standards and guidance that refer to noise management.*

Best Practice Measures

12.5 Best Practice Measures

RW-BPM-29	Minimising Dust Emissions From Site Activities
Environmental Commitment	
Minimise dust emissions from site activities	
Work Sections/Locations	
All construction works locations	
Responsibility of	**Role/Duty**
Construction Manager	• Provide site induction to site personnel and contractors regarding the dust control measures

Training and Communication

- Provide site induction to site personnel and contractors regarding the dust control measures
- Community engagement before works commence will be carried out.
- The name and contact details of the Community Liaison Officer and Environmental Clerk of Works will be displayed on the informational signage at the Site Compound No.1. The CLO and the ECoW will be the point of contact regarding air quality and dust issues.

Measures to minimize dust emissions

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that is likely to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.
- During movement of materials both on and off-site, trucks will be covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected by a visual inspection by a competent person to ensure no potential for dust emissions. If dust potential exists it will be mitigated using the appropriate measures such as wheel washing or covering of materials.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Materials will be adequately covered, especially if being stored for long periods of time to prevent dust emissions primarily during dry or windy periods.
- Permanent stockpiles of soils will be reseeded as soon as practical following placement.
- If dust issues start to occur, refer to 'Guidance on the Assessment of Dust from Demolition and Construction' for additional measures put in place to avoid any significant impacts.
- Provide site induction to site personnel and contractors regarding the dust control measures

References

- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII, 2011)

Topic Air

• Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)	
RW-BPM-31	**Measuring Operational EMF Emissions**
Environmental Commitment	
Work Sections/Locations	
Mountphilips Substation and 110kV UGC route	
Responsibility of	**Role/Duty**
Operational Manager – UWF	• Ensure operational EMF emissions are measured
Measures to minimize dust emissions	
• A confirmatory survey of Electromagnetic Field emissions from locations along the Internal Wind-farm Cabling will be carried out by a competent engineer. The locations along the Internal Wind-farm Cabling will include the following 9 No. local road crossings in Knockmaroe/Knockcurraghbola Crownlands, Knockcurraghbola Commons and Foilnaman. • Reporting by the competent engineer of the compliance of operational EMF emission levels with the levels predicted in the 2018 EIA Report.	
References	
• EIA Report for UWF Related Works (2018)	

Summary of the Air Chapter

12.6 Summary of the Air Chapter

UWF Related Works is located in a rural sparsely populated upland area in County Tipperary. The area has good air quality, and is considered to be a quite rural location with no major existing noise sources. Community facilities are concentrated in the nearby villages of Upperchurch, Rearcross and Kilcommon.

Local residents and members of the local community using community facilities, and transient people were evaluated as sensitive aspects of Air. Transient people relate to farm/forestry workers, road users and walkers/cyclists along roads or waymarked trails.

The construction of UWF Related Works will result in some dust and noise emissions. Measures have been designed into the project to avoid and reduce effects to Local Residents and members of the Community including limiting construction works to daytime hours only, and controlling the timing of construction works in the Knockmaroe and Knockcurraghbola Crownlands area to ensure that the UWF Related Works is not constructed at the same time as any other part of the Whole UWF Project in this area.

The operation of the UWF Related Works will result in increases in EMF in the area around the Internal Windfarm Cabling trenches. The calculation of the increase in ambient EMF levels was based on the maximum power output levels so that the worst-case possible levels of EMF were evaluated. Once operational, the actual levels of EMF will be recorded to confirm that levels of EMF as a result of the UWF Related Works either alone or in-combination are not greater than the levels reported in this EIA Report

12.6.1 Summary of UWF Related Works Impacts

- Adverse impacts to Local Residents & Community due to increases in ambient dust or noise levels is limited to the construction stage, and expected to be no greater than Slight or Moderate respectively.
- Adverse impacts to Local Residents & Community due to increased EMF emissions during the operation of the Internal Windfarm Cables will be no greater than Imperceptible.
- Neutral impacts or no impacts are expected to Transient People due to increases in ambient dust or noise levels.
- Adverse impacts to Transient People due to increased EMF emissions are expected to be no greater than Imperceptible, under worst case scenario calculations.

12.6.2 Summary of UWF Related Works Cumulative Impacts

UWF Related Works cumulative effects are mainly associated with cumulative effects with Upperchurch Windfarm works, though there is potential for UWF Grid Connection to contribute to cumulative effects in the Knocknabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands areas.

- The addition of UWF Grid Connection and Upperchurch Windfarm will not increase the impacts to Local Residents & Community, above the impact levels outlined above for the UWF Related Works on its own.
- Adverse cumulative impacts to Transient People due to combined increases in EMF emissions will be cumulatively Imperceptible in relation to the combined effects UWF Related Works with Upperchurch Windfarm, and cumulatively Imperceptible to Slight in relation to the UWF Related Works with UWF Grid Connection, or at the Consented UWF Substation fence.

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12.6.3 Summary of Whole UWF Project Impact

There will be increases in EMF from the new Mountphilips Substation, on public roads over the 110kV UGC, at the consented UWF Substation and UWF Turbines, as well as on lands over Internal Windfarm Cabling.

- Worst case increases in EMF to Local Residents & Community, will not be greater than Slight for construction stage dust, Moderate for construction noise, Imperceptible for operational EMF.
- Adverse cumulative impacts to Transient People due to increases in EMF emissions will not be greater than Imperceptible to Slight for people, and Slight for AIMDs which could be worn by Transient People.

12.6.4 Summary of Whole UWF Project Cumulative Impacts with Other Projects or Activities

There is no potential for cumulative impacts of UWF Related Works with Other Projects and Activities.

The potential for cumulative impacts of the Whole UWF Project with Other Projects or Activities only relates to the in-combination effect of UWF Grid Connection with the existing 110kV and 220kV overhead lines in the Mountphilips/Coole area, where cumulative impacts to Local Residents & Community or Transient People will not be greater than Imperceptible to slight for people, and Slight for AIMDs which could be worn by Transient People.

Reference List

12.7 Reference List

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Environmental Protection Agency – Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), 2016.

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Institute of Acoustics Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.
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National Grid UK, EMF Information: http://www.emfs.info/UK Institute of Air Quality Management (2014) *Guidance on the Assessment of Dust from Demolition and Construction*
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An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040

An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040

Air Topic

UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 13: Climate

Topic Chapter Authors:

EIAR Coordinator:

January 2019

Topic
Climate

Contents

Climate Topic

Topic: Climate

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Glossary of Terms

Term	Definition
Embodied emissions / embodied energy	These are defined as the energy consumed by all of the processes associated with the production of a development, from the mining and processing of natural resources to manufacturing, transport and product delivery
CO_2eq	This is defined as the 'carbon dioxide equivalent'. It is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO_2eq signifies the amount of CO_2 which would have the equivalent global warming impact
Capacity Factor	Is how much electricity a power plant actually produces compared to how much it would produce if it operated at full nameplate capacity 100% of the time. Expressed as a % of full nameplate capacity.
EU ETS	The EU Emissions Trading System which is part of the EU's policy to combat climate change and its key tool for reducing greenhouse gas emissions cost-effectively. It is the world's first major carbon market and remains the biggest one
Mt	Mt refers to Megatonne values. 1 Mt = 1 Million Tonnes
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.

Topic
Climate

13 Environmental Factor: Climate

13.1 Introduction to the Climate Chapter

13.1.1 What is Climate?

Climate is defined as the average weather over a period of time. Climate change is a significant change in this average weather. Climate change is a natural phenomenon but in more recent years has also become a result of human activities through the release of greenhouse gases (GHGs). These GHGs are altering the Earth's atmosphere resulting in a 'Greenhouse Effect'. This is causing an increase in the atmospheres heat trapping abilities resulting in increased average global temperatures over the past number of years. The release of carbon dioxide as a result of burning fossil fuels, has been one of the leading factors in the creation of this 'Greenhouse Effect'.

13.1.2 Overview of Climate in the Local Environment

Ireland has signed up to several Climate agreements including the "2030 Climate and Energy Policy Framework" which aims to reduce GHG emissions by 40% compared with 1990 levels by 2030. In 2016, Ireland had non-ETS sector emissions of 43.8 Mt CO2eq (1 Mt = 1 million tonnes), this is 0.3 Mt CO_2eq higher than Irelands annual target for emissions, therefore Ireland was in exceedance of its EU 2020 target (EC Decision 406/2009/EC7) in 2016. EPA projections indicate that Ireland will breach our annual obligations from 2017 to 2020 in the best-case scenario and therefore reduction measures are required in all sectors. Further details on international climate agreements can be found in Section 13.3 Policy Context.

13.1.3 Sensitive Aspects of the Climate 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 Aspect is **included in this topic chapter** as it could be potentially impacted:

Sensitive Aspect No. 1	Climate	Section 13.2

The above listed Sensitive Aspect is evaluated in Section 13.2 of this Chapter.

To help readers navigate, the colour code for the Sensitive Aspect used above is also used in the Sensitive Aspect Section 13.2. The colour-code has been applied to the section headings, tables and on side-tabs on the edge of the pages.

13.1.4 Sensitive Aspects excluded from further evaluation

No Sensitive Aspects were excluded from this topic chapter.

13.1.5 Overview of the Subject Development

The UWF Related Works are the subject development, being the subject of this appeal to An Bord Pleanála. The main parts of the UWF Related Works are identified in Table 13-1 below.

Table 13-1: 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.

13.1.6 The Author of the Climate Chapter

This report was written by Ciara Nolan, BSc (Hons) in Energy Systems Engineering and Master in Applied Environmental Science, of AWN Consulting Ltd. She is an Associate Member of the Institute of Air Quality Management and specialises in the fields of ambient and indoor air quality monitoring and EIA. AWN Consulting is a multidisciplinary environmental consultancy specialising in Acoustics, Air Quality, Climate, Waste, Water and Soil Quality, Flora and Fauna and Seveso II Major Accident Hazard Land Use Assessments.

13.1.7 Sources of Baseline Information

The information sources outlined in Table 13-2 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 13-2: Sources of Baseline Information for Climate

Type	Source
Guidelines	• UK Environment Agency carbon calculator for construction sites (Version 3.6, 2014)[1]
Desktop	• Review of all available EPA data on GHG levels in Ireland • Review of any energy targets or climate agreements to which the Irish government has signed up • Chapter 9: Land • Chapter 10: Soils • Chapter 15: Material Assets - Roads Consented Upperchurch Windfarm planning documents • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Environmental Impact

[1] UK Environment Agency Carbon Calculator for Construction Activities (2014)

Type	Source
	Statement 13510003 • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Response to Further Information 13510003 • An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 • An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040
Fieldwork	• No fieldwork was required

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

13.1.7.1 Certainty and Sufficiency of Information Provided

The information used to compile this chapter is collated from reports and documents generated by local authorities and statutory agencies, including the Environmental Protection Agency, the UK Environment Agency and Sustainable Energy Authority of Ireland. The most recent publications have been relied upon, with references detailed as footnotes throughout the chapter. In the absence of relevant guidance documents, professional opinion has been used.

13.1.8 Methodology for Evaluating Effects

13.1.8.1 Carbon sequestration

Carbon sequestration is the process involved in the long-term storage of atmospheric carbon dioxide. The following carbon sequestration rates for trees have been used in this appraisal:

Trees have the ability to sequester carbon with the peak CO_2 uptake rate for tree stands of the order of 5 – 20 tonnes of CO_2 / hectare/ year with CO_2 uptake rates declining before stand maturity. Additionally, after afforestation on mineral soils, there will be an increase of soil carbon (C) soon after planting of the order of 0.2 – 1.7 tonnes of CO_2 / hectare/ year[2]

According to Morrison et al.[2] a Sitka spruce plantation has a maximum CO_2 sequestration rate of 20.5 tonnes of CO_2 / hectare/ year over a 40-year period, based on British forests. A long-term CO_2 uptake rate of 3.2 tonnes of CO_2 / hectare/ year can be applied to provide a conservative estimate of the uptake rate associated with this type of plantation.

A maximum CO_2 sequestration rate of 13 tonnes of CO_2 / hectare/ year over a 55-year period can be applied to Oak plantations (a native species to Ireland). A long-term CO_2 uptake rate of 2.1 tonnes of CO_2 / hectare/ year can be applied to provide a conservative estimate of the uptake rate associated with the UWF Replacement Forestry element, which will consist of native woodland species

[2] Morison, J., Matthews, R., Miller, G., Perks, M., Randle, T., Vanguelova, E., White, M. and Yamulki, S. (2012). 'Understanding the carbon and greenhouse gas balance of forests in Britain' Forestry Commission Research Report

13.2 Sensitive Aspect No.1: Climate

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

13.2.1 UWF RELATED WORKS – EVALUATED AS EXCLUDED

13.2.1.1 Baseline Characteristics of Climate in relation to UWF Related Works

Under the EU Commission's Climate and Energy Package, Ireland is required to deliver a 20% reduction in non-ETS (Emissions Trading Scheme) greenhouse gas emissions by 2020 (relative to 2005 levels). In addition, Ireland also has binding annual emission limits for the period 2013-2020 to ensure a gradual move towards the 2020 target. The non-ETS sectors cover those that are outside the EU Emissions Trading Scheme and includes the agriculture, transport, residential, commercial, waste and non-energy intensive industries[3].

Windfarms will help in achieving Ireland's targets by supplying renewable energy to the Grid and reducing the use of fossil fuels for energy production.

UWF Related Works is located in County Tipperary and will facilitate the construction and operation of the already Consented Upperchurch Windfarm.

13.2.1.2 Evaluation of UWF Related Works

UWF Related Works was evaluated for its potential to cause impacts to Climate.

It was evaluated by the topic authors that UWF Related Works **will cause Neutral impacts to Climate,** for the following reasons

- No potential to positively directly impact Climate through increasing renewable energy production - the UWF Related Works will not themselves not generate renewable electricity, though their purpose is to support the construction of the renewable generator, the consented Upperchurch Windfarm,
- Neutral impacts to Climate due to increases in GHG emissions as the volume of embodied emissions from construction materials and from excavated or hardstand areas and emissions from vehicles, machinery or equipment such as mobile generators, as the emissions have been calculated at substantially less than 1% of Ireland's 2020 national emission ceiling for CO_2,
- Neutral impacts to Climate due to forestry felling, as the loss of forested land results in the loss of an area capable of uptaking 6.5 tonnes of CO_2/yr which is substantially less than 1% of Ireland's 2020 national emission ceiling for CO_2.
- Neutral impacts to Climate due to increased GHG emissions during the operational stage, due to the infrequent nature and very small scale of any maintenance works required the increase in GHG emissions from maintenance vehicles can be considered negligible,
- There will be a Neutral impact to climate as a result of decommissioning activities due to the low volume of machinery and vehicles required.

[3] EPA (2017) Ireland's Final Greenhouse Gas Emissions 2015 and previous reports (2011 -2014)

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13.2.1.3 Cumulative Evaluation for the Other Elements *(grey background)*

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.

UWF Related Works will cause Neutral impacts to Climate by itself, and therefore cannot have a cumulative effect. However, 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 Section 13.2.2 to Section 13.2.4 and included in the summary table in Section 13.2.8 in order to show the totality of the project.

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13.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

13.2.2.1 Cumulative Evaluation Study Areas

13.2.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works as been excluded as a source of impacts (either positive or negative) to Climate due to its negligible levels of GHG emissions during a temporary construction stage, negligible scale of forestry felling, negligible levels of emissions associated with either operation or decommissioning, and the fact that UWF Related Works will not in itself produce renewable electricity.

13.2.2.1.2 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.

UWF Related Works will cause Neutral impacts to Climate by itself, and therefore will not cause noticeable cumulative effects. However, 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 Section 13.2.2 to Section 13.2.4 and included in the summary table in Section 13.2.8 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 13.2.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area for the evaluation of cumulative effects is described in Table 13-3.

Table 13-3: Whole Project Cumulative Evaluation Study Area for Climate

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Irish State	Any climatic effects, if significant will have the potential to impact Ireland's commitments and targets under various EU Climate Agreements and other international agreements.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

13.2.2.2 Scoping for Other Projects or Activity & Potential for Impacts

The evaluation of cumulative impacts to Climate 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 Climate with 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 A2.3.2.13).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Climate with UWF Related Works however in order to present the totality of the project – Operational

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Windfarms in the Republic of Ireland have been scoped in for evaluation of cumulative effects relating to the Other Elements.

13.2.2.2.1 Potential for Impacts to Climate

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 Climate. The results of this evaluation are included in Table 13-4.

Table 13-4: 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	Evaluated as excluded: No potential for effects/Neutral effects due to • No potential to positively directly impact Climate through increasing renewable energy production - the UWF Grid Connection itself will not generate renewable electricity, though it's purpose is to transport renewable electricity from the consented Upperchurch Windfarm to the National Grid, • Neutral impacts to Climate due to increases in GHG emissions, as the volume of embodied emissions from construction materials and from excavated or hardstand areas and emissions from vehicles, machinery or equipment such as mobile generators, as the emissions have been calculated at substantially less than 1% of Ireland's 2020 national emission ceiling for CO_2, • Neutral impacts to Climate due to increased GHG emissions during the operational stage, due to the infrequent nature and very small scale of any potential maintenance/repair works required on any aspect of the project the increase in GHG emissions from maintenance vehicles can be considered negligible.
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects/Neutral effects due to • No potential to positively directly impact Climate through increasing renewable energy production - the UWF Replacement Forestry will not produce renewable electricity • Neutral impact to Climate as a result of the planting of trees, as the new native woodland will result in an area capable of uptaking 9.2 tonnes CO2/yr which would offset substantially less than 1% of Ireland's 2015 national GHG emissions and will have a Neutral impact on Climate. • Neutral impact to Climate due to the use of vehicles or equipment during planting or maintenance works at the afforestation lands, as any GHG emissions from vehicles or equipment associated with the UWF Replacement Forestry will be of a very low magnitude due to the relatively small scale of the works and the avoidance of the use of large machinery during planting works.
Element 4: Upperchurch Windfarm (UWF)	**Included for the evaluation** of cumulative effects in relation to Increasing Renewable Energy Production, Evaluated as excluded in relation to adverse effects from increases in GHG emissions and reductions in the carbon sink potential of the UWF lands due to: • Neutral impacts to Climate due to increases in GHG emissions as the volume of embodied emissions from construction materials and from excavated or hardstand areas and emissions from vehicles, machinery or equipment such as mobile generators, as the emissions have been calculated at substantially less than 1% of Ireland's 2020 national emission ceiling for CO_2, • Neutral impacts to Climate due to forestry felling, as the loss of forested land results in the loss of an area capable of uptaking 95 tonnes of CO_2/yr which is

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	equivalent to substantially less than 1% of Ireland's 2020 national emission ceiling for CO_2. • Neutral impacts to Climate due to increased GHG emissions during the operational stage, due to the infrequent nature and very small scale of any maintenance works required the increase in GHG emissions from maintenance vehicles can be considered negligible, • There will be a Neutral impact to climate as a result of decommissioning activities due to the low volume of machinery and vehicles required.
Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects/Neutral effects due to: • No potential to positively directly impact Climate through increasing renewable energy production - the UWF Other Activities will not produce renewable electricity • Neutral impact to Climate as a result of the planting of trees, as new hedgerows and trees will result in an area capable of uptaking 3.4 tonnes CO2/yr which would offset substantially less than 1% of Ireland's 2015 national GHG emissions and will have a Neutral impact on Climate. • Neutral impact to Climate due to the use of vehicles or equipment as activities will be very small scale, with minor volumes of equipment and machinery required.
Other Projects or Activities	
Operational Windfarms in the Republic of Ireland	Yes, included for the evaluation of cumulative effects **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.

13.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

Under the EU Commission's Climate and Energy Package, Ireland is required to deliver a 20% reduction in non-ETS (Emissions Trading Scheme) greenhouse gas emissions by 2020 (relative to 2005 levels). In addition, Ireland also has binding annual emission limits for the period 2013-2020 to ensure a gradual move towards the 2020 target. The non-ETS sectors cover those that are outside the EU Emissions Trading Scheme and includes the agriculture, transport, residential, commercial, waste and non-energy intensive industries[4]. Windfarms will help in achieving Ireland's targets by supplying renewable energy to the Grid and reducing the use of fossil fuels for energy production.

The EPA publish estimates of Irelands greenhouse gas emissions each year, the most recent available data is from 2016 and is based on the SEAI's final energy balances for 2016[4]. Greenhouse gases (GHGs) have different efficiencies in retaining solar energy in the atmosphere and different lifetimes in the atmosphere. In order to compare different GHGs, emissions are calculated on the basis of their Global Warming Potential (GWPs) over a 100-year period, giving a measure of their relative heating effect in the atmosphere. The GWP100 for carbon dioxide (CO_2) is the basic unit (GWP = 1) whereas methane gas (CH_4) has a global warming potential equivalent[5] to 21 units of CO_2 and nitrous oxide (N_2O) has a GWP100 of 310.

[4] EPA (2018) Ireland's Final Greenhouse Gas Emissions 1990 - 2016

[5] Greenhouse gases other than CO_2 (i.e. methane, nitrous oxide and so-called F-gases) may be converted to CO_2 equivalent using their global warming potentials, thereby providing a CO_2 equivalent or CO_2eq value.

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Agriculture was the greatest source of emissions in 2016[4] at 32.3% of CO_2eq. The next largest share of energy emissions in 2016 was from energy production (20.5% of total emissions) and road transport (20% of total emissions). Waste represented 1.6% of total emissions in 2016[4]. Emissions from waste consist mainly of methane (CH_4) with small amounts of other GHGs.

Compliance with the European Union's Effort Sharing Decision "EU 2020 Strategy" (Decision 406/2009/EC[6]) has been assessed since 2013. In 2016, Ireland had non-ETS sector emissions of 43.8 Mt CO_2eq (1 Mt = 1 million tonnes), this is 0.3 Mt CO_2eq higher than Irelands annual target for emissions, therefore, Ireland was in exceedance of its EU 2020 target (EC Decision 406/2009/EC[6]) in 2016.

13.2.2.3.1 Element 1: UWF Grid Connection

Not applicable – Element evaluated as excluded. See Section 13.2.2.2.1

13.2.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 13.2.2.2.1

13.2.2.3.3 Element 4: Already Consented Upperchurch Windfarm

The Upperchurch Windfarm will produce renewable sustainable electricity from the wind, offsetting 128,118 tonnes of greenhouses gases each year.

Consideration of the Passage of Time: The passage of time was considered during a review of the sources of information. There have been changes in the baseline environment since 2013, these changes involve Ireland's annual GHG emissions and compliance with the EU Commissions 2020 targets.

The EPA publish estimates of Irelands greenhouse gas emissions each year, the most recent available data is from 2016 and is based on the SEAI's final energy balances for 2016.

Agriculture was the greatest source of emissions in 2016 at 32.3% of CO_2eq. The next largest share of energy emissions in 2016 was from fuel combustion for power generation (20.5% of total emissions) and road transport (20.0% of total emissions). Industry and commercial sources account for 5.1% of emissions in 2016.

Compliance with the European Union's Effort Sharing Decision "EU 2020 Strategy" (Decision 406/2009/EC) has been assessed since 2013. In 2016, Ireland had non-ETS sector emissions of 43.8 Mt CO2eq (1 Mt = 1 million tonnes), this is 0.3 Mt CO_2eq higher than Irelands annual target for emissions, therefore provided estimates for 2016 are correct, Ireland was in exceedance of its EU 2020 target (EC Decision 406/2009/EC7) in 2016.

These changes have been considered, where relevant, in the cumulative evaluations in this Revised EIAR.

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13.2.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 13.2.2.2.1

13.2.2.3.5 Other Projects or Activities

There are 233 operational windfarms in Ireland, which together off-set approximately 6.2 million tonnes of greenhouses gasses each year. 2,909.66 MW based on 233 windfarms.

[6] European Council (2009) Decision 406/2009/EC Effort of Member States to reduce their greenhouse gas emissions to meet the community's greenhouse gas emission reduction commitments up to 2020

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13.2.2.4 Cumulative Information Baseline Characteristics - Importance of Climate

Climate is of great importance, not just in relation to Ireland, but globally. Impacts as a result of climate change involve increases in global temperatures and increases in the number of rainfall days per year. Ireland has seen increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east[7], this is evident in the increased flooding events in recent years. The EPA[7] have compiled a list of potential adverse impacts as a result of climate change which include:

- sea level rise;
- more intense storms and rainfall events;
- increased likelihood and magnitude of river and coastal flooding and
- water shortages in summer in the east;
- adverse impacts on water quality;
- changes in distribution of plant and animal species;
- effects on fisheries sensitive to changes in temperature.

The United Nations Framework on the Convention on Climate Change (UNFCCC) is continuing detailed negotiations in relation to greenhouse gases (GHGs) reductions and in relation to technical issues such as Emission Trading and burden sharing. Ireland has signed up to a number of national and international agreements in relation to climate change (see Section 13.3 Policy Context).

13.2.2.5 Cumulative Information Baseline Characteristics - Sensitivity of Climate

As mentioned, climate change is a result of increased levels of carbon dioxide and other greenhouse gases in the atmosphere causing the heat trapping potential of the atmosphere to increase. The release of carbon dioxide from the burning of fossil fuels is a major cause of climate change. Greenhouse gases can be emitted from vehicles and embodied energy (or embodied emissions) associated with materials used in the construction of a development.

Forests are an important part of the global carbon cycle and effective management at a regional scale can help to reduce GHG concentrations[8]. Trees are a natural carbon sink and absorb carbon dioxide from the atmosphere helping in the reduction of climate change; any felling of forestry results in a loss of this carbon sink thus, increasing the levels of carbon dioxide in the atmosphere. However, increased planting of trees on suitable lands will, over time, help to increase the carbon sink potential of the land and benefit climate.

13.2.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)

2013 and 2014 saw a decreasing trend in Ireland's GHG emissions, this can be attributed to a decrease in economic activity. The agriculture and transport sectors make up the majority of non-ETS emissions making up 72.4% of emissions in 2014. Energy production using fossil fuels is continually decreasing in recent years with renewable energy production increasing. Renewable energy production increased by 6.6% on 2012 levels in 2013 and by 12.6% based on 2013 levels in 2014. This increasing trend continued into 2015 with a 4% increase in renewable energy production based on 2014 levels. However, overall, 2015 data shows a 3%

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[7] EPA (2017) 'What impact will climate change have for Ireland' http://www.epa.ie/climate/communicatingclimatescience/whatisclimatechange/whatimpactwillclimatechangehaveforireland/

[8] Morison, J., Matthews, R., Miller, G., Perks, M., Randle, T., Vanguelova, E., White, M. and Yamulki, S. (2012). '*Understanding the carbon and greenhouse gas balance of forests in Britain*' Forestry Commission Research Report

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increase in other non-ETS emissions. This change in trend is a result of increasing economic growth and employment. Ireland was in exceedance of its target by 0.3 Mt CO_2eq in 2016 and projections for 2017 – 2020 indicate this target will also be breached in future years[4].

13.2.2.7 Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)

Non-ETS emissions include emissions from agriculture, transport, residential and waste. It is likely that Ireland will be in breach of its EU 2020 target by the time construction commences on the Whole UWF Project.

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13.2.3 Cumulative Information: PROJECT DESIGN MEASURES for Climate

There are no Project Design Environmental Protection Measures specific to Climate

13.2.4 Cumulative Information: EVALUATION OF IMPACTS to Climate

It is evaluated that **UWF Related Works has no potential to cause impacts to Climate**, see Section 13.2.1.

This Section evaluates the **likely cumulative effects of Other Elements** of the Whole UWF Project (in particular the Upperchurch Windfarm) and Other Projects or Activities.

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) - Climate.

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

Table 13-5: 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)*
Increase in Renewable Energy Production (operational stage)	***No impacts Excluded***

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the next section – Section 13.2.4.1.

The source-pathway-receptor links which were excluded are described in Section 13.2.2.2.1.

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13.2.4.1 Impact Evaluation Table: Increase in Renewable Energy Production

Evaluation of UWF Related Works Excluded: As the UWF Related Works will not produce electricity, there is no potential for UWF Related Works to cause positive renewable energy production effects to Climate by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Related Works is part of a whole project. Therefore, the cumulative information and evaluation for the Other Elements of the Whole UWF Project (in particular the Upperchurch Windfarm) are included in this Impact Evaluation Table, in order to show the totality of the project.

Cumulative Impact Description for the Other Elements of the Whole UWF Project	
Project Life Cycle Stage: *(for Other Elements only)*	Operational Stage
Cumulative Impact Source: Renewable energy generated by wind turbines Impact Pathway: Energy market Impact Description: Increase in availability of renewable energy on the market, reducing reliance on fossil fuels for energy production, positively impacting climate as there will be reduced GHG emissions. Impact Quality: **Positive**	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection– *N/A, evaluated as excluded, see Section 13.2.2.2.1*	
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 13.2.2.2.1*	
Element 4: Consented Upperchurch Windfarm	
Impact Magnitude: The 22 No. turbines constructed as part of the Upperchurch Windfarm will generate approximately 150 million kWh of renewable energy per annum, which according the 2013 EIS, will "*avoid the emission of 128,118 tonnes of greenhouse gases per annum which would result from generating the same amount of electricity by fossil fuel plant*."	
Significance of the Impact: Slight (positive)	
Rationale for Impact Evaluation: • Long-term generation of renewable electricity will reduce future CO_2 emissions from fossil fuels, • The increasing importance of reducing GHG emissions both nationally and globally, • The increased levels of renewable energy will help Ireland in achieving our renewable energy targets for 2020 and 2030	
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 13.2.2.1.1*	

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Cumulative Information: Individual Evaluations of Other Projects or Activities

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).

Other Project: Operational Windfarms in the Republic of Ireland

Impact Magnitude: The Republic of Ireland has a generating capacity of 2,910 MW based on 233 windfarms[9].According to the SEAI 2016 Report on Renewable Electricity in Ireland 2015[10], the average generating capacity of Irish windfarms was 32%. Based on this capacity factor, avoiding the emissions of 6,070,101 tonnes of CO_2 eq or 14% of Ireland's 2015 non-ETS sector emissions.

Significance of the Impact: Significant (positive)

Rationale for Impact Evaluation:

- The increased availability of renewable energy reduces GHG emissions from fossil fuel burning for energy production in future years.
- The increasing importance of reducing GHG emissions both nationally and globally
- Ireland is more likely to meet its renewable energy target for of 40% electricity production from renewables by 2020 (see Section 13.3 Policy Context).

Evaluation of Other Cumulative Impacts– Increase in Renewable Energy Production

All Elements of the Whole UWF Project

Cumulative Impact Magnitude: The 22 No. turbines constructed as part of the Upperchurch Windfarm will generate approximately 150 million kWh of renewable energy per annum, which according the 2013 EIS, will "*avoid the emission of 128,118 tonnes of greenhouse gases per annum which would result from generating the same amount of electricity by fossil fuel plant*."

Significance of the Cumulative Impact: No Cumulative Impact

Rationale for Cumulative Impact Evaluation:

- The consented Upperchurch Windfarm is the only element which will result in impacts to Climate from the generation of renewable electricity which will reduce future CO_2 emissions from fossil fuels.

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

Cumulative Impact Magnitude: The inclusion of the Upperchurch Windfarm Project will increase Ireland's overall emissions saving to 6,198,219 tonnes of CO_2 eq, or 14.5% of Ireland's 2015 non-ETS sector emissions.

Significance of the Cumulative Impact: Significant (positive)

Rationale for Cumulative Impact Evaluation:

- The increased availability of renewable energy reduces GHG emissions from fossil fuel burning for energy production in future years.
- Ireland is more likely to meet its renewable energy target for of 40% electricity production from renewables by 2020 and transition to a low carbon economy (see Section 13.3 Policy Context).

[9] Irish Wind Energy Association (IWEA) (2017) Windfarm Details by County http://www.iwea.com/index.cfm/page/bycounty/id/9 Accessed 4 October 2017

[10] SEAI (2016) Renewable Electricity in Ireland 2015

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13.2.5 Mitigation Measures for Impacts to Climate

Mitigation measures are not relevant as **UWF Related Works will cause Neutral impacts** to Climate.

13.2.6 Evaluation of Residual Impacts to Climate

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 13.2.1), i.e. **Neutral impacts.**

13.2.7 Application of Best Practice and the EMP for Climate

The production of the Upperchurch Windfarm element will be recorded during the early operational stage to monitor the actual levels of production against the levels used in this EIA Report:

RW-BPM-32	Measuring Operational Electricity Production

This Best Practice Measure is included in full at the end of this topic chapter, and also forms part of the UWF Related Works Environmental Management Plan, which is included as Volume D with the planning application.

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13.2.8 Summary of Impacts to Climate

The topic authors conclude that UWF Related Works will cause Neutral impacts to Climate.

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

Table 13-6: Summary of the impacts to Climate

Impact to Climate:	**Increase in Renewable Energy Production**
Evaluation Impact Table (for Other Elements only)	*Section 13.2.4.1*
Project Life-Cycle Stage *(for Other Elements only)*	Operational Stage
UWF Related Works	**No Potential for Impacts Evaluated as Excluded - see Section 13.2.1**
Element 1: UWF Grid Connection	No Potential for Impact - Evaluated as Excluded, see Section 13.2.2.2.1
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 13.2.2.2.1
Element 4: Upperchurch Windfarm	**Slight (positive)**
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 13.2.2.2.1
Other Cumulative Impacts: *(for Other Elements only)*	
Whole UWF Project Effect	**No Cumulative Imp** *((Upperchurch Windfarm only)*
All Other Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities: Operational Windfarms in the Republic of Ireland	**Significant (positive)**

(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).

Policy Context

13.3 Policy Context

13.3.1 National Policy

EU Directive 2009/28/EC promotes the use of renewable energies with a commitment for Member States to achieve a renewable energy target of 20% of the EU's final energy consumption by 2020. Each Member State is set an individual target for renewable energy consumption; Ireland had a target of 16% to be achieved by 2010. In line with this the Irish Government enacted the National Renewable Energy Action Plan (NREAP) which sets a target of 40% electricity generation to come from renewable sources by 2020. The Irish Governments strategy document 'Strategy for Renewable Energy 2012 – 2020' aims to achieve Ireland's 2020 targets at a minimum. The White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015 – 2030' aims to transform Ireland to a low carbon economy. In order to achieve Ireland's 2020 renewables target of 40% a total of 3,000 – 4,000 MW of onshore renewable generation will be necessary. Therefore, the average rate of build of onshore wind generation will need to increase by approximately 90MW per year.

The Whole UWF Project will help to facilitate the 2020 targets by generating 150 million kWh of renewable energy per annum

13.3.2 Regional Policy

The Mid-West Regional Planning Guidelines 2010-2022 (MWRPG) state that one of the key investment priorities required to support the development of the Region is the strengthening of the electricity transmission grid in the Region. The Section on Energy and Utilities (MWRPG Section 6.6) states that there is a need to strengthen the transmission network in the Region with emphasis on three particular areas, with one of the three being the need to make provision for the connection of renewable energy resources from suitable areas of the Region. The MWRPG state that '*These Guidelines favour expediting connections and incorporate modifications proposed by EirGrid in respect of speedier connections to the National Grid by way of a positive bias toward the development of grid infrastructure*'.

13.3.3 North Tipperary County Development Plan 2010 (as varied):

Provisions for climate change adaptation are presented in Chapter 8 of this plan. The Climate Change and Low Carbon Development Bill 2015 is specified within this section and it is stated that it will ensure that economic development and climate change adaption are integral to each other. This Plan (as varied), promotes sustainable settlement and transportation patterns, flood risk management, energy efficiency in new development and the development of renewable energy as some of the important measures in achieving the targets and objectives of the national strategies and guidelines with the collective aim of decreasing dependence on imported fossil fuels, reducing emissions, and embracing the transition to a low carbon and climate resilient future. The Whole UWF Project will help in facilitating a low carbon energy future and thus reducing the potential for climate change with increased availability of renewable energy.

There is also a strong emphasis on the expansion of the national grid to ensure regional connectivity for sustainable economic growth as well as facilitate the development and connectivity of sustainable renewable energy resources. The UWF Grid Connection will facilitate the connection to the national electricity network of the consented renewable energy generator, Upperchurch Windfarm.

Topic: Climate

13.4 Best Practice Measures

RW-BPM-32	Measuring Operational Electricity Production
Environmental Commitment: to monitor levels of renewable energy production annually	
Location: Consented Upperchurch Windfarm Substation	
Responsibility of	Operational Manager – UWF
Role/Duty	• Record annual electricity production levels
Monitoring measure	
• Recording and reporting of the annual renewable electricity production of the operational UWF.	
References	
• UWF Related Works EIA Report (2018)	

Summary of the Climate Chapter

13.5 Summary of the Climate Chapter

Climate is defined as the average weather over a period of time. Climate change is a significant change in this average weather. Ireland has signed up to several Climate agreements including the "2030 Climate and Energy Policy Framework" which aims to reduce GHG emissions by 40% compared with 1990 levels by 2030. Under the EU Commission's Climate and Energy Package, Ireland is required to deliver a 20% reduction in non-ETS (Emissions Trading Scheme) greenhouse gas emissions by 2020 (relative to 2005 levels).

Windfarms will help in achieving Ireland's targets by supplying renewable energy to the Grid and reducing the use of fossil fuels for energy production. The UWF Related Works is one Element of the Whole Upperchurch Windfarm Project. The purpose of UWF Related Works is purpose is to support the construction of the renewable generator, the consented Upperchurch Windfarm.

13.5.1 Summary of UWF Related Works Impacts

- UWF Related Works has no potential to positively directly impact Climate through increasing renewable energy production - as the UWF Related Works itself will not generate renewable electricity. *The positive impact of the renewable electricity produced by Upperchurch Windfarm is described in Section 13.5.2 below.*
- The UWF Related Works itself will cause Neutral impacts to Climate due to the very small scale of emissions which will mainly arise as a result of the construction stage, and the very small amount of forestry felling required to develop the project.

13.5.2 Summary of UWF Related Works Cumulative Impacts

- UWF Related Works will cause Neutral impacts to Climate by itself, and therefore cannot have a cumulative effect.
- The UWF Related Works itself will cause Neutral impacts to Climate due to the very small scale of emissions which will arise during the construction stage, and the very small amount of forestry felling required to develop the project and therefore cannot have a cumulative effect.

13.5.3 Summary of the Whole UWF Project Effect

As UWF Related Works is one element of the larger Whole Upperchurch Windfarm Project (Whole UWF Project), the cumulative impacts of the Other Elements of the Whole UWF Project are summarised here to show the totality of the whole project.

- With the exception of Upperchurch Windfarm the Other Elements (UWF Grid Connection, UWF Replacement Forestry or UWF Other Activities) will also have Neutral effects on Climate.
- The **Upperchurch Windfarm element will cause Slight positive effects to Climate** due to the production of renewable energy during its lifetime.
- As only one Element can cause effects, there is no potential for cumulative effects of the Elements with each other.

Topic: Climate

13.5.4 Summary of the Whole Project Effect cumulatively with Other Projects or Activities

The cumulative impact with Other Projects or Activities only relates to the in-combination effect of the consented Upperchurch Windfarm with Other Operational Windfarms in the Republic of Ireland.

- There is no potential for UWF Related Works to contribute to cumulative effects with Other Projects or Activities.
- Cumulative positive impacts to Climate **in relation to meeting Ireland's 2020 targets** of the Upperchurch Windfarm with the other operational windfarms in the Republic of Ireland will be **Significant and Positive.**

13.6 Reference List

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UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 14: Material Assets (Built Services)

Topic Chapter Authors:

EIAR Coordinator:

January 2019

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

List of Appendices

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Appendix 14.1	Location of Built Services within the Study Area

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

Glossary of Terms

Term	Definition
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.

List of Abbreviations

Abbreviation	Full Term
PD	Ecopower Project Design Environmental Protection Measure developed by members of the EIAR Team
BPM	Ecopower Best Practice Measure developed by members of the EIAR Team
AMM	Ecopower Additional Mitigation Measure developed by members of the EIAR Team
Electrical grid	An interconnected network for delivering electricity from producers (generators such as windfarms) to consumers (industrial, business and residential electricity users).
LV	Low Voltage
MV	Medium Voltage – i.e. 10kV – 20kV (10,000 -20,000 Volts)
HV	High voltage – i.e. 38kV, 110kV and 220kV (38,000, 110,000 volts and 220,000 volts re-spectively)

14 Environmental Factor: Material Assets (Built Services)

14.1 Introduction to the Material Assets (Built Services) Chapter

14.1.1 What is Material Assets (Built Services)?

Built Services relate to the pipes, overhead lines, underground cables and wireless signals which supply drinking water, electricity, telephone and broadband services to houses, businesses and community facilities.

Water supply relates to the network of water mains and pipes which are part of the public Irish Water network. Pipes and mains related to private water supply (in the form of group schemes) are also considered, however the sources of private water supply (i.e. wells, springs etc) are evaluated in Chapter 11: Water.

Electricity supply relates to both the local Low Voltage (LV), Medium Voltage (MV) such as the 20kV networks which supply local houses and businesses; and high voltage 38kV, 110kV and 220kV lines which form part of the electricity system.

Communications supply relates to the overhead lines and underground telecommunication cables, which form part of the Eir network. Communications supply also relates to privately owned telecommunication masts and associated wireless signals. Overview of Material Assets (Built Services) in the Local Environment

14.1.2 Overview of Built Services in the Local Environment

The Built Services in the area are mainly made up of overhead telephone lines which are located along roadside boundaries, and overhead electricity lines which are generally located in fields close to the local roads, which are connected to local residences and well as a small number of community facilities and local businesses. As the study area is sparsely populated, the number of houses and other properties connected to Built Services is very low. Other above-ground built services include a telecommunications mast, known as the Foilnaman Mast, at Knockmaroe, along with other small masts in the wider area. There is a small Eir exchange building, outside the study area, in Kilcommon village.

There is an Irish Water reservoir in Knocknabansha which supplies the Knocknabansha area along with the villages of Kilcommon and Rear Cross. These water supplies are via underground water mains, which are located in and along public roads.

The location of the UWF Related Works is illustrated on OSI Mapping on Figure RW 14.1: Location of the UWF Related Works.

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

14.1.3 Sensitive Aspects of Built Services 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	Local Residents & Community	Section 14.2
Sensitive Aspect No. 2	Electricity Transmission System	Section 14.3

Each of the above listed Sensitive Aspects are evaluated individually in Sections 14.2 to 14.3 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 14.2 to 14.3. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

14.1.4 Sensitive Aspects excluded from further evaluation

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

Built Services Infrastructure & the Owners & Operators of Built Services Infrastructure (Public Water Mains and Pipes, Electricity Lines, Telephone Lines and Communication Cables, Telecommunication Masts, Gas Mains and Pipes, Waste Water pipes and treatment plants, private water supply pipes)	Evaluated as excluded, no likely effects/ Neutral effects No Likely Impact – due to the implementation of UWF Grid Connection and UWF Related Works project design measures, including confirmatory surveys, consultation with the service owners and operators, and the use of goal posts and supervision. No Likely Impact in relation to UWF Replacement Forestry as heavy machinery and major excavation works will not be required. Notwithstanding the above, Neutral impact (worst case impact) due to the very small extent (64km of underground water pipes, 82km of overhead electricity lines, 59km of overhead telephone line, 4km of underground electricity cables and 0.2km underground communication cables) which could be affected by the UWF Grid Connection and UWF Related Works, in the context of the size of the networks nationally. Each service equates to considerably less than 0.1% of the owner/operators national networks – 63,000km of water mains, 150,000km of electricity lines[1], and overhead telephone lines and underground Eir communication cables supplying c.2 million customers in Ireland[2].

[1] https://www.esbnetworks.ie/who-we-are/our-networks
[2] https://www.eir.ie/pressroom/

14.1.5 Overview of the Subject Development

The UWF Related Works are the subject development, being the subject of this appeal to An Bord Pleanála. The main parts of the UWF Related Works are identified in Table 14-1 below.

Table 14-1: 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.

14.1.6 The Authors of the Material Assets (Built Services) Chapter

This report on the Environmental Factor Material Assets - Built Services, was written by a number of authors.

The Water supply sections have been written by David Broderick (BSc, H. Dip Env Eng, MSc): Hydrogeologist and Michael Gill (B.A., B.A.I., M.Sc., Dip. Geol, MIEI): Environmental Engineer of Hydro-Environmental Services (HES) which was established in 2005 as a hydrological, hydrogeological and environmental practice, specialising in surface water and groundwater management including water supply development and protection.

The Electricity supply sections have been written by Ruairí Geary, Chartered Engineer, who is a design team leader within TLI Group. Ruairí has over 10 years' experience in a wide range of Electrical/Mechanical engineering projects, specialising in the area of distribution and transmission network design, and in particular working on the ESB system. TLI Group is a utility infrastructure consultancy and construction company, operating extensively within the utilities sector both in Ireland and internationally. Designing and building overhead power lines and underground cables with associated structures are the company's core expertise.

The Communications supply sections have been written by Kevin Hayes (Masters in Electronic Engineering and a Software Design Engineer) of Ai Bridges. Kevin has in excess of 15 years of experience in telecommunications network design, analysis and troubleshooting of radio frequency issues and development of telecommunication projects. Services provided by Ai Bridges include; Electromagnet Interference (EMI) Impact studies, TV interference Remediation, Aviation & Radar Studies, Hot Zone Studies and also expert witness reporting for planning and post-planning application requirements.

14.1.7 Sources of Baseline Information

The information sources outlined in Table 14-2 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 14-2: Sources of Baseline Information for Material Assets (Built Services)

Type	Source
Consultation	Feedback was received from: • Infrastructure owners; ESB Networks, Eirgrid, Eir, Irish Water, Airspeed, Three Ireland, and Gas Networks Ireland, • Landowners (associated with the development) regarding water supply • National Federation of Group Water Schemes See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.
Guidelines	• Irish Water (2016): Connections and Developer Services – Code of Practice for Water Supply Infrastructure (A Design and Construction Guide for Developers); and, • Health and Safety Authority (2016): Code of Practice for Avoiding Danger from Underground Services, • Code of Practice for Avoiding Danger from Overhead Electricity Lines (DOC-230910-BBA).
Desktop	• Review of Irish Water Services Mapping • Review of Eir Mapping • Modelling of microwave radio link paths to/from Foilnaman Telecommunications Mast • Review of ESBN Existing Asset Database • Review of Eirgrid 110kV Functional Specifications • Review of ESB Networks Functional Specifications • Review of Gas Networks Ireland Mapping • Review of ComReg Quarterly Key Data Report Q1 2017 • Chapter 15: Material Assets - Roads 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 • An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 • An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040
Fieldwork	• Site walkover of construction works areas • GPS survey of all existing Irish Water/Eir/ESBN networks within 20m of works areas, • Survey of Foilnaman Mast

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

14.1.7.1 Certainty and Sufficiency of Information Provided

A clear documentary trail is provided throughout this chapter and chapter appendices to the competency of data and methods used and the rationale for selection of same. The information used to compile this chapter has been collated from the results of field and desktop surveys. Data and maps (mapped water mains, overhead lines and underground etc) were obtained through consultation with the service owners, i.e. Eir, ESBN, Irish Water etc. In all cases the most recent data and publications are relied upon.

14.1.8 Methodology for Evaluating Effects

There is no specific guidance on the production of a Material Assets chapter of an EIA Report, with respect to Built Services. However, experience with EIA and planning systems together with the EPA guidance on EIS preparation (2002 & 2017) has informed the production of this appraisal.

14.2 Sensitive Aspect No.1: Local Residents & Community

This Section provides a description and evaluation of the Sensitive Aspect - Local Residents & Community.

Local Residents & Community relates to the local residences, businesses and community facilities that are connected to Built Services.

14.2.1 BASELINE CHARACTERISTICS of Local Residents & Community

14.2.1.1 STUDY AREA for Local Residents & Community

The study area for Local Residents & Community in relation to the UWF Related Works is described in Table 14-3 and illustrated on Figure RW 14.2: Local Residents & Community (Built Services) within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 14-3: UWF Related Works Study Area for Local Residents & Community

Study Area for Local Residents & Community	Justification for the Study Area Extents
Local residences and businesses connected to: - underground cables and pipes within the construction works area boundaries associated with the UWF Related Works, - overhead lines within 7m of the construction works area boundaries associated with the UWF Related Works to allow for machinery movement. The extent of the study area is from the fault point to the nearest valve/transformer/cabinet.	Effects to Local Residents & Community are limited to direct physical damage to the lines, pipes or cables which supply their properties during construction works. The extent of the study area is limited to those local residents using Irish Water/Eir/ESB services who could be affected by an outage and whose service cannot be re-directed through another part of the Irish Water/Eir/ESB networks.

14.2.1.2 Baseline Context and Character of Local Residents & Community in the UWF Related Works Study Area

The majority of Built Service users in the UWF Related Works Study Area comprise local residences. The number of businesses in the locality is few, and while most people commute to work, there may be a small number of people who use their house to work from home or as a home-office. Farming is an important enterprise in the study area, with farmsteads and farmyards scattered throughout the locale.

During consultations with Irish Water, ESBN and Eir, a number of overhead and underground services were identified and mapped, and verified by the various authors of this chapter during site investigations. The properties in the area which could be connected to these Built Services were also identified through desktop and field surveys. The location of these services and the associated Local Residents & Community are outlined on Table 14-4 and illustrated on Figure RW 14.2. Further details on the individual Built Services are included in Appendix 14.1: Location of Built Services within the Study Area.

Due to the upland nature of the study area, local residences and businesses are widely dispersed and are generally located at the end of the water, electricity and telephone networks. While there is no large concentration of residences along any section of any of the networks within the study area, Local Residents & Community are more numerous in the areas close to villages such as Kilcommon and Upperchurch. There are also a cluster of residences in Knocknabansha at the junction of the R503 with the R497, and along the L2264-50 Borrisoleigh Road.

Table 14-4: Summary of Local Residents & Community connected to Irish Water, ESB and Eir networks in the UWF Related Works Study Area

Project Element	Local Residents & Community connected to Irish Water Mains	Local Residents & Community connected to Local ESB Network	Local Residents & Community connected to the Local Eir Network
UWF Related Works	C. 25 No. properties connected to 2 No. length of Irish Water Mains, these water mains run parallel to construction works in the road (L-2264-50, L6188-0).	c.92 No. properties connected to 8 No. overhead electricity lines and 2 No. underground electricity cables. These overhead lines and underground cables are generally located in fields beside the local road network.	C.57 No. properties connected to 9 No. telephone lines, these overhead lines are generally located in roadside boundaries.

14.2.1.3 Importance of Local Residents & Community

It is considered that public water supply is highly valued, as it is likely to be the sole source of water for most Irish Water customers.

Electricity supply is also considered to be of high value as the sole source of electricity for most local residents and businesses.

Fixed line telephone and broadband services, on the other hand, have less of an importance locally due to the availability and widespread use of mobile phones and wireless signals.

14.2.1.4 Sensitivity of Local Residents & Community

Local Residents & Community are sensitive to any temporary loss of built services due to damage to pipes, cables or overhead lines or due to planned outages.

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

Irish Water are currently undertaking a national programme of works on their networks to reduce leakage and improve water supply nationally. As part of their Capital Investment Programme, the water treatment plant and network associated with the Newport Regional Water Supply Scheme has recently being upgraded[3]. Discussions with Irish Water (pers. comms Newport Regional Water Supply, November 2017) did not identify any upcoming plans to upgrade or reduce leakage on the local networks within the study area.

The electricity network is being continuously upgraded through refurbishment programs and expanded through new connections, though this is happening slowly, particularly in rural areas such as the study area.

In recent years the popularity and adoption of mobile telephones and mobile broadband has grown significantly and the dependence on fixed line telephone service over traditional overhead lines or underground cables is decreasing. This trend is likely to continue especially in rural areas where the use of fixed line telephone services are expected to continue decreasing, albeit it at a slow rate.

[3] https://www.water.ie/projects-plans/national-projects/leakage-reduction-programme/, Pers.Comms Newport Regional Water Supply, November 2017

The number of residences, businesses and community facilities in the area is likely to increase slowly in line with increases in the population of the area. According to Chapter 6 Population of this EIAR, 'in the last five years there has been a notable slowdown in population growth with a modest 1.4 per cent increase recorded in Census 2016'. It is expected that most new residences, business and community facilities will be located in or close to Newport, Rear Cross and Kilcommon, in line with the North Tipperary County Development Plan, (Section 2.3.1) which states 'it is planned that future population growth in the county will be accommodated in existing towns and villages in line with a county settlement hierarchy, and also through sensitive development in rural areas with infrastructure delivered in a timely fashion to ensure sustainable and inclusive communities'.

14.2.1.6 Receiving Environment (the Baseline + Trends)

As population trends and network upgrades are happening very slow, it is assumed that the existing baseline environment for Local Residents & Community, described above, will be the receiving environment during the Construction Stage of the subject development.

Local Residents & Community

Sensitive Aspect

14.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

14.2.2.1 Cumulative Evaluation Study Area

14.2.2.1.1 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 Local Residents & Community	Justification for the Study Area Extents
Local residences and businesses and community facilities connected to underground cables and pipes within the construction works area boundaries and overhead lines within 7m of the UWF Related Works construction works area boundaries to allow for machinery movement. The extent of the study area is from the fault point to the nearest valve/transformer /cabinet.	Effects to Local Residents & Community are limited to direct physical damage to the lines, pipes or cables which supply their properties during construction works. The extent of the study area is limited to those local residents using Irish Water/Eir/ESB services who could be affected by an outage and whose service cannot be re-directed through another part of the Irish Water/Eir/ESB networks.

The study is illustrated on Figure CE 14.2: Local Residents & Community within the UWF Related Works Cumulative Evaluation Study Area.

14.2.2.1.2 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 14.2.2.2.1 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 14-5 and illustrated on Figure WP 14.2: Local Residents & Community (Built Services) within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 14-5: Whole Project Cumulative Evaluation Study Area for Local Residents & Community

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Local residences and businesses and community facilities connected to underground cables and pipes within the construction works area boundaries and overhead lines within 7m of the construction works area boundaries to allow for machinery movement. The extent of the study area is from the fault point to the nearest valve/transformer /cabinet.	Effects to Local Residents & Community are limited to direct physical damage to the lines, pipes or cables which supply their properties during construction works. The extent of the study area is limited to those local residents using Irish Water/Eir/ESB services who could be affected by an outage and whose service cannot be re-directed through another part of the Irish Water/Eir/ESB networks.
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5:		

Material Assets (Built Services)

Topic

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
UWF Other Activities		

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

The evaluation of cumulative impacts to Local Residents & Community 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 Local Residents & Community 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 A2.3.2.14).

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 Local Residents & Community.

14.2.2.1.1 Potential for Impacts to Local Residents & Community

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 Local Residents & Community. The results of this evaluation are included in Table 14-6.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 14.2. The baseline character of the areas around these projects is described in Section 14.2.2.3.

Table 14-6: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Elements 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 During consultations with Irish Water, ESBN and Eir, a number of overhead and underground services were identified and mapped, and verified by the various authors of this chapter during site investigations, with overhead Eir telephone lines routed along and overhead ESBN electricity lines routed across the Local Road L2264-34 in Foilnaman, from which access to the UWF Replacement Forestry lands will be through an existing farm access point. • No potential to cause loss of supply of water, telephone or electricity services to Local Residences & Community, due to the absence of excavation works and large machinery - all planting and maintenance activities will be carried out by hand, any vehicles used will be standard vans or four-wheel drive vehicles and trailers.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects due to: • The absence of any structures, and the absence of excavation works and large machinery associated with the Haul Route Activities, Overhead Line Activities, Monitoring Activities and the Upperchurch Hen Harrier Scheme.

Local Residents & Community

Sensitive Aspect

14.2.2.2 Cumulative Information: Baseline Characteristics – Context & Character

In relation to the Other Elements of the Whole UWF Project, the location of services and associated Local Residents & Community are outlined on Table 14-7 and illustrated on Figure WP 14.2. Further details on the individual Built Services are included in Appendix 14.1.

14.2.2.2.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

The interaction with Built Services relates to the 110kV UGC, which is routed along the public roads L2166-0, R503, L2264-50 and L6188-0. End users of built services are mainly in Newport town, and to a much lesser extent in Rear Cross village, through both of which the 110kV UGC will pass. Elsewhere, due to the upland nature of the study area, local residences and businesses are widely dispersed and are generally located at the end of the water, electricity and telephone networks. There are also a cluster of residences along the L2264-50 Borrisoleigh Road.

Table 14-7: Summary of Local Residents & Community connected to Irish Water, ESB and Eir networks in the Cumulative Evaluation Study Area

Cumulative Project	Local Residents & Community connected to Irish Water Mains	Local Residents & Community connected to Local ESB Network	Local Residents & Community connected to the Local Eir Network	Local Residents & Community connected to the Local Gas Network
UWF Grid Connection	C. 1080 No. properties connected to 15 No. lengths of Irish Water Mains, a water mains run parallel to the 110kV UGC in the L2166-0, R503 and L2264-50 the mains crosses the UGC to services other adjacent public roads	C.1500 No. properties connected to 75 No. overhead electricity lines and 1 No. underground electricity cables. These overhead lines and underground cables are generally located in fields beside the road network.	C.996 No. properties connected to 22 No. overhead lines telephone lines and 14 No. underground telephone lines, these overhead lines are generally located in roadside boundaries.	C.700 No. properties connected to 3 No. underground gas lines, along the UGC route these lines are only in Newport town.

Overlap of UWF Grid Connection with the UWF Related Works Cumulative Evaluation Study Area: Properties located off the L-2264-50 in the Knockmaroe/Knockcurraghbola area could be affected by both UWF Grid Connection and UWF Related Works, these properties are supplied by:

- 1 No. Irish Water main on the L2264-50 (29 No. properties),
- 1 No. overhead electricity line (32 No. properties), and
- 1 no. overhead telephone line (22 No. properties).

14.2.2.2.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 14.2.2.2.1

14.2.2.2.1 Element 4: Consented Upperchurch Windfarm

Local residences are sparsely dispersed in the area around Upperchurch Windfarm and are generally located at the end of the water, electricity and telephone networks.

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Table 14-8: Summary of Local Residents & Community connected to Irish Water, ESB and Eir networks in the Cumulative Evaluation Study Area

Cumulative Project	Local Residents & Community connected to Irish Water Mains	Local Residents & Community connected to Local ESB Network	Local Residents & Community connected to the Local Eir Network	Local Residents & Community connected to the Local Gas Network
Upperchurch Windfarm	C. 25 No. properties connected to 2 No. length of Irish Water Mains, these water mains run across the site entrances along the road (L-2264-50, L6188-0).	c.1 No. properties connected to 1 No. electricity line across a field at Knockmaroe.	C.40 No. properties connected to 3 No. telephone lines, these overhead lines are generally located in roadside boundaries.	

Consideration of the Passage of Time: There have been no new built services installed on stretches of road at Upperchurch Windfarm site entrances, and no new services built across lands under which Consented Upperchurch Windfarm construction works or construction machinery will pass. While the effects to local residents of an interruption of built service supplies was not specifically evaluated in the 2013 EIS, it is now considered in the evaluations in this Revised EIAR for UWF Related Works.

14.2.2.2.2 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 14.2.2.2.1

14.2.2.2.3 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 14.2.2.1.

14.2.3 PROJECT DESIGN MEASURES for Local Residents & Community

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 14-8 are relevant to the Environmental Factor, Material Assets (Built Services), and in particular to the sensitive aspect **Local Residents & Community**.

Table 14-9: UWF Related Works Project Design Measures relevant to Local Residents & Community

PD ID	Project Design Environmental Protection Measure (PD)
PD01	All construction works will be carried out during daylight hours.
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.
PD04	Confirmatory consultations with Irish Water, Eir and ESB and confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a foreman will look out for underground pipes during excavations near services.

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 design of the UWF Grid Connection. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3 (Volume C4: EIAR Appendices).

14.2.4 EVALUATION OF IMPACTS to Local Residents & Community

In this Section, the likely direct and indirect effects of the UWF Related Works and the likely cumulative effects of 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) - Local Residents & Community.

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

Table 14-10: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included	***Impacts Excluded*** *(Justification in next section)*
No Impacts Included for Evaluation	*Loss of water/electricity/ communications service(s) (construction stage)*

The source-pathway-receptor links and the rationale for excluded impacts are described in Section 14.2.4.1.

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14.2.4.1 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from evaluation are described in Table 14-10 below.

Table 14-11: Description and Rationale for Excluded Impacts to Local Residents & Community

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				
• Public road opening excavations • Excavations associated with ground-works • movement of large machinery	1, 2, 4	Physical contact with overhead lines and underground cables and water mains	Loss of water/ electricity/ communications service(s)	Rationale for Excluding: No likely effect due to protection measures included as part of the project design (See Section 14.2.3). These protection measures comprise; the use of 'goal posts' and foreman during construction; confirmatory pre-construction consultations with Irish Water, Eir and ESB; and pre-construction confirmatory surveys at service locations ahead of works. In any case, Neutral impact, due to the short duration of the impact with service lost for c.1 day while damaged pipes, lines or cables are being repaired, the reversibility of the loss of service and in the context of the provision for a 3 day (ESB) or 5 day (Eir) repair/service restoration as standard, in service level agreements with these companies.
Relocation of telephone or electricity poles/lines	2	Planned outage	Loss of water/ electricity/ communications service(s)	Rationale for Excluding:: Neutral impact, due to the notification of local residents or business of the outage ahead of works, which will allow them to plan for the outage; the alternative means of communication available, and the completion of works in one day in the context of the provision for 3 day (ESB) or 5 day (Eir) repair/service restoration as standard in service level agreements.
Operational Stage				
Rationale for Excluding: No likely impacts to Local Residents & Community as no excavation works or use of large machinery in close proximity to Built Services are expected or planned				
Decommissioning Stage				
Rationale for Excluding: No potential for impacts/no likely impacts UWF Grid Connection will not be decommissioned. Decommissioning works and activities related to UWF Related Works or Upperchurch Windfarm will mainly take place from turbine hardstands on the Upperchurch Windfarm, at locations away from local Built Services.				

Material Assets (Built Services)

Topic

14.2.5 Mitigation Measures for Impacts to Local Residents & Community

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 **impacts are not likely** to occur to Local Residents & Community as a consequence of the UWF Related Works.

14.2.6 Evaluation of Residual Impacts to Local Residents & Community

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures were required, and thus the Residual Impact is the same as the Impact set out in Section 14.2.4.1 – i.e. **no likely impact**.

14.2.7 Application of Best Practice and the EMP for Local Residents & Community

No UWF Related Works Best Practice Measures have been developed specifically for Local Residents & Community.

14.2.8 Summary of Impacts to Local Residents & Community

A summary of the Impact to Local Residents & Community is presented in Table 14-11.

Table 14-12: Summary of the impacts to Local Residents & Community

Impact to Local Residents & Community:	**No Impact**
Evaluation	*Section 14.2.4.1*
Project Life-Cycle Stage	All
UWF Related Works *Direct, indirect, cumulative effects*	**No likely impact/Neutral impact**
Element 1: UWF Grid Connection	No likely impact/ Neutral impact
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 14.2.2.2.1
Element 4: Upperchurch Windfarm	No likely impact/ Neutral impact
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 14.2.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	**No potential for cumulative impacts**

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

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Local Residents & Community with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 14.2.2.1).

14.3 Sensitive Aspect No.2: Electricity Transmission System

This Section provides a description and evaluation of the Sensitive Aspect - Electricity Transmission System.

In this EIA Report, the Electricity Transmission System relates to the Killonan – Nenagh 110kV Overhead Line. The consented Upperchurch Windfarm will connect to this line through the UWF Grid Connection.

14.3.1 UWF RELATED WORKS – EVALUATED AS EXCLUDED

14.3.1.1 Baseline Characteristics of Electricity Transmission System in relation to UWF Related Works

There are no transmission system assets, such as overhead 110kV or 220kV lines in the area around the UWF Related Works.

14.3.1.2 Evaluation of UWF Related Works

UWF Related Works was evaluated for its potential to cause impacts to Electricity Transmission System.

It was evaluated by the topic authors that UWF Related Works has no potential to cause impacts to **Electricity Transmission System,** for the following reasons:

- due to the absence of any Electricity Transmission System Assets in the area.

14.3.1.3 Cumulative Evaluation for the Other Elements *(grey background)*

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.

UWF Related Works has no potential to cause impacts to Electricity Transmission System by itself, and therefore cannot have a cumulative effect. However, 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 Section 14.3.2 to Section 14.3.4 and included in the summary table in Section 14.3.8 in order to show the totality of the project**.**

14.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

14.3.2.1 Cumulative Evaluation Study Area

14.3.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works as been excluded as a source of impacts (either positive or negative) to the Electricity Transmission System due to the absence of any Electricity Transmission System Assets in the area, and the absence of any new connections or interactions with the Electricity Transmission System associated with UWF Related Works.

14.3.2.1.2 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.

UWF Related Works has no potential to cause impacts to Electricity Transmission System by itself, and therefore cannot have a cumulative effect. However, 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 Section 14.3.2 to Section 14.3.4 and included in the summary table in Section 14.3.8 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 14.3.2.2.1 below.

The study area for the evaluation of whole project cumulative effects is described in Table 14-12 and illustrated on Figure WP 14.3: Electricity Transmission System within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 14-13: Whole Project Cumulative Evaluation Study Area for Electricity Transmission System

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Existing Killonan to Nenagh 110kV overhead line	Transmission system asset to which the Upperchurch Windfarm will be connected.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

14.3.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Electricity Transmission System 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 Electricity Transmission System 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 A2.3.2.14).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Electricity Transmission System with UWF Related Works however in order to present the totality of the project – Bunkimalta Windfarm and Castlewaller Windfarm (both consented) have been scoped in for evaluation of cumulative effects relating to the Other Elements.

14.3.2.1.1 Potential for Impacts to Electricity Transmission System

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 Electricity Transmission System. The results of this evaluation are included in Table 14-13.

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 14.3.

Table 14-14: 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	Evaluated as excluded: No potential for effects due to the absence of any Electricity Transmission System Assets in the area, and no connections or interactions with the System associated with this project.
Element 4: Upperchurch Windfarm (UWF)	Evaluated as excluded: No potential for effects due to • the absence of any Electricity Transmission System Assets in the area, • while electricity generated by the Upperchurch Windfarm will be transported on the Killonan-Nenagh 110kV OHL, this electricity will be carried via the UWF Grid Connection, and therefore there are no connections or interactions with the System associated with Upperchurch Windfarm directly, any potential for effects have been evaluated as part of the UWF Grid Connection element
Element 5: UWF Other Activities	Evaluated as excluded: Neutral impact or No potential for impacts due to: • Neutral effect to the Electricity Transmission System during the wrapping and re-sagging (Overhead Line Activities) due to the line between Killonan and Nenagh being de-energised and switched out. This will have no effect on Killonan as this station is the feed point, i.e. all power flows from Killonan to Nenagh. There will also be no interruption to the distribution of electricity from the Nenagh Substation as electricity supply to Nenagh will be sourced from the existing 38kV grid network at the Nenagh 110kV Substation, • No potential for effects caused by the remaining UWF Other Activities (Haul Route Activities, Monitoring Activities or Upperchurch Hen Harrier Scheme) as these activities do not interact with the Electricity Transmission System.
Other Projects or Activities	
Bunkimalta Windfarm	Included for the evaluation of cumulative effects **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
Castlewaller Windfarm	Evaluated as excluded: No potential for impacts due to:

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	• No potential for cumulative impacts with UWF Grid Connection, as any connection works or outages for Castlewaller Windfarm will not take place during the same time period as those associated with UWF Grid Connection, this is because a grid connection offer from the electricity system operator has not yet issued to Castlewaller Windfarm. In contrast, Upperchurch Windfarm has already secured a grid connection offer.

14.3.2.2 Cumulative Information: Baseline Characteristics – Context & Character

The UWF Grid Connection is the only part of the Whole UWF Project which is relevant to the Electricity Transmission System, as it will involve the connection of a new substation onto the Killonan – Nenagh 110kV overhead line (OHL).

14.3.2.2.1 Element 1: UWF Grid Connection

The Killonan – Nenagh 110kV OHL is c.41km long, originating in the Killonan 220kV Station and ending in the Nenagh 110kV Substation and comprises 110kV overhead lines mounted on a mixture of double wooden poles and lattice steel towers. The section of the line between Ahane and Silvermines is relatively new, being built in 2012/2013. The other sections, between Killonan and Ahane, and Nenagh and Silvermines are older and were built in the 1970's and 1990's respectively.

The UWF Grid Connection will connect onto the Killonan – Nenagh 110kV OHL just to the north of Poleset No.79, approximately one third of the way along the line between Killonan and Nenagh.

The Killonan – Nenagh 110kV OHL is controlled and fed from the Killonan 220kV Station, which is located to the southeast of Limerick City. The Killonan Station is one of the main transmission system stations in the country with 3 No. 220kV lines feeding into it - from Tarbert, Knockraha and Shannonbridge. This power is then distributed through the Killonan Station to the mid-west region using numerous regional networks at all voltages (110kV, 38kV and 20kV). One of these regional networks is the Killonan to Nenagh 110kV OHL, which is c.41km long, originating in the Killonan 220kV Station and ending in the Nenagh 110kV Substation.

14.3.2.2.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 14.3.2.2.1

14.3.2.2.3 Element 4: Already Consented Upperchurch Windfarm

Not applicable – Element evaluated as excluded. See Section 14.3.2.2.1

14.3.2.2.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 14.3.2.2.1

14.3.2.2.5 Other Projects or Activities

Other Projects/Activities relate to the consented Bunkimalta Windfarm and the consented Castlewaller Windfarm. It is intended by the project developer of the Bunkimalta Windfarm to connect to Nenagh Substation, rather than directly onto the Killonan – Nenagh 110kV OHL.

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.

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Topic

14.3.2.3 Cumulative Information Baseline Characteristics - Importance of Electricity Transmission System

The nationwide electricity transmission system allows for the transport of large volumes of electricity from generation stations, including wind farms, to bulk supply points near the main population centres where it interconnects with the distribution system[4]. According to the Eirgrid Transmission Development Plan 2012 to 2022, the Killonan Station is the main bulk supply point for the Mid-West region. The Killonan – Nenagh 110kV OHL is one of the main electricity supplies into Nenagh town.

14.3.2.4 Cumulative Information Baseline Characteristics - Sensitivity of Electricity Transmission System

The Killonan – Nenagh 110kV OHL can be affected by damage to the lines due to adverse weather conditions such as high wind and ice, or faults at the Killonan Station. However, the network protection and control systems would allow Nenagh to be fed from the 38kV network which is also connected to the Nenagh Substation.

14.3.2.5 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)

Due to the condition and age of the transmission equipment in Killonan 220/110 kV station, a major project involving the replacement of the whole station is currently on-going under Eirgrid's Transmission Development Plan 2012 to 2022, *CP0624: Reinforcement of the Transmission Network in Limerick City Project*. There are currently no plans for the 110kV part of the Nenagh Substation. Once lines or stations are built or upgraded, they generally do not need further upgrading works for c.40 years.

14.3.2.6 Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)

It is assumed that the existing Killonan – Nenagh 110kV OHL will be the receiving environment at the commencement of the operational stage

[4] https://www.esbnetworks.ie/who-we-are/our-networks

14.3.3 Cumulative Information: PROJECT DESIGN MEASURES for Electricity Transmission System

Potential impacts caused by the Other Elements of the Whole UWF Project only relates to the UWF Grid Connection. There are no UWF Grid Connection Project Design Environmental Protection Measures specific to the Electricity Transmission System.

14.3.4 Cumulative Information: EVALUATION OF IMPACTS to Electricity Transmission System

It is evaluated that **UWF Related Works has no potential to cause impacts to Electricity Transmission System**, see Section 14.3.1.

This Section evaluates the **likely cumulative effects of the Other Elements** of the Whole UWF Project and Other Projects & Activities – in particular the UWF Grid Connection.

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) - Electricity Transmission System.

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

Table 14-15: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included	***Impacts Excluded*** *(Justification in next section)*
No Impacts Included for Evaluation	*Interruption of power supply on the electricity system (construction stage)*
	Adding a control point to the Killonan to Nenagh 110kV OHL (operational stage)

The source-pathway-receptor links and the rationale for excluded impacts are described in Section 14.3.4.1.

14.3.4.1 Cumulative Information: 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 14-15 below.

Table 14-16: Description and Rationale for Excluded Impacts to Electricity Transmission System
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				
Commissioning of the Mountphilips Substation	1	Planned outage	Interruption of power supply on the electricity system	Rationale for Excluding: No potential for impacts - During the commissioning of the new Mountphilips Substation, the line between Killonan and Nenagh will be de-energised and switched out. This will have no effect on Killonan as this station is the feed point, i.e. all power flows from Killonan to Nenagh. There will also be no interruption to the distribution of electricity from the Nenagh Substation as electricity supply to Nenagh will be sourced from the existing 38kV grid network at the Nenagh 110kV Substation. Cumulative impacts with Bunkimalta Windfarm connection are not likely as the two connections will be planned by EirGrid/ESBN in a manner that avoids power supply interruptions on the system.
Operational Stage				
Addition of new substation onto the Killonan - Nenagh 110kV OHL	1	Killonan to Nenagh 110kV overhead line	Adding a control point to the Killonan to Nenagh 110kV OHL	Rationale for Excluding: The addition of the Mountphilips Substation will add an operational control point for ESBN on this tail fed line. The main function of the new substation will be to transport electricity from the Upperchurch Windfarm onto the line, and although the addition of a new control point will be of benefit to ESB Networks in the form of a new asset and will strengthen the network into Nenagh, it will not cause measurable positive effects to the overall transmission system due to the tail fed nature of this line which will continue to be controlled from Killonan Station. There is no potential for cumulative impacts with Bunkimalta Windfarm as that project will not involve a new substation on the line.
Decommissioning Stage				
Rationale for Excluding: No potential for impacts to Electricity Transmission System as the UWF Grid Connection will form part of the National Grid on a permanent basis and will not be decommissioned.				

14.3.5 Mitigation Measures for Impacts to Electricity Transmission System

Mitigation measures are not relevant as there is **no potential for UWF Related Works to cause impacts** to Electricity Transmission System.

14.3.6 Evaluation of Residual Impacts to Electricity Transmission System

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 14.3.1), i.e. **no potential for impacts.**

14.3.7 Application of Best Practice and the EMP for Electricity Transmission System

No UWF Related Works Best Practice Measures have been developed specifically for Electricity Transmission System.

14.3.8 Summary of Impacts to Electricity Transmission System

The topic authors conclude that there is no potential for UWF Related Works to cause impacts to Electricity Transmission System.

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 14-17: Summary of the impacts to Electricity Transmission System

Impact to Electricity Transmission System:	**No Impact**
Evaluation *(for Other Elements only)*	*Section 14.3.4.1*
Project Life-Cycle Stage *(for Other Elements only)*	Construction/Operation
UWF Related Works	**No Potential for Impacts** **Evaluated as Excluded - see Section 14.3.1**
Element 1: UWF Grid Connection	No Likely Impact/ Neutral Impact
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 14.3.2.2.1
Element 4: Upperchurch Windfarm	No Potential for Impact - Evaluated as Excluded, see Section 14.3.2.2.1
Element 5: UWF Other Activities	Neutral Impact/No Potential for Impact - Evaluated as Excluded, see Section 14.3.2.2.1
Cumulative Impact: *(Other Element – UWF Grid Connection, only)*	
All Other Elements of the Whole UWF Project	**No potential for Cumulative Impacts**
All Other Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Bunkimalta Windfarm	**No potential for Cumulative Impacts**

(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)

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Topic

14.4 Policy Context

14.4.1 Regional Policy

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.

There are no policies particular to the construction works areas with regard to Water Services Infrastructure, Broadband Infrastructure and Telecommunications in Chapter 6: Transport and Infrastructure.

With regard to Telecommunications, there is a statement in Section 6.7 for Development Plan Implications (Telecommunications) where; *Planning Authorities should also identify the circumstances in which infrastructure developments can be used to provide opportunities for the installation of facilities to accommodate broadband services and shall adopt policies to facilitate such installation in appropriate circumstances.*

In Chapter 2: Regional Planning Guidelines in Context in section 2.7.4 Future Investment Priorities one of the 'key investment priorities required to support development in the Region is *Strengthening of the electricity transmission grid in the Region*.The provision of new 110kV infrastructure is compatible with this priority, and will be an additional asset on the system.

The Regional Planning Guidelines also contain the study Forfás Regional Competitiveness Agenda: Realising Potential: Mid-West which is '*a suite of Regional Competitiveness Agendas (RCAs) for each of the regions. The RCAs take an enterprise perspective, recognising that enterprise is a key driver for regional growth and national economic development*'. In Chapter 4. Realising Future Potential: Sectoral Opportunities at Energy and Environmental Potential one of the Key Assets which the region is considered to be well placed to exploit is '*The Mid-West has the highest potential generating capacity of renewable energy in the country*'

The subject application is part of realising the wind energy development potential of the region.

14.4.2 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 North Tipperary until such time as a single County Development Plan is prepared for the County.

Policies for Built Services are contained in Chapter 9: Transport, Water Services & Environmental Management of the County Development Plan. There are no policies particular to the construction works areas with regard to Water Services Infrastructure, Broadband Infrastructure and Telecommunications in Chapter 9.

In Chapter 8: Climate Change, Energy & Flooding Section 8.5 Access to the Electricity Supply Network it states; 'The appropriate expansion of the national grid is important to ensure adequacy of regional connectivity for sustainable economic growth as well as facilitate the development and connectivity of sustainable renewable energy resources. In this respect, the Council will facilitate the sustainable and appropriate development of additional electricity generation capacity throughout the region/county and support the sustainable expansion of the network. The subject application is compatible with this commitment.

14.5 Best Practice Measures

No UWF Related Works Best Practice Measures have been developed specifically for Material Assets (Built Services).

14.6 Summary of the Material Assets (Built Services) Chapter

Built Services relate to the pipes, overhead lines, underground cables and wireless signals which supply drinking water, electricity, telephone and broadband services to houses, businesses and community facilities.

Sensitive Aspects which were evaluated in this topic chapter include Local Residents & Community who are the end users of Built services, and the Electricity Transmission System which consists of the 110kV and 220kV electricity networks.

In relation to Local Residents & Community, due to the upland nature of the study area, end-users of Built Services such as local residences are widely dispersed and are generally located at the end of the water, electricity and telephone networks. Community facilities are mainly located in villages such as Kilcommon and Upperchurch.

The construction works associated with UWF Related Works will include the use of large machinery and the excavation of trenches in close proximity to both overhead lines and underground services. Project Design Measures will be implemented during construction works to minimise the likelihood of damage occurring to Built Services, through the use of goal posts, supervision, confirmatory surveys, and working during daylight hours.

In relation to the Electricity Transmission System, the UWF Related Works does not include any 110kV electrical parts, neither is UWF Related Works connected to or located near any transmission system assets.

14.6.1 Summary of UWF Related Works Impacts

- No impacts (loss of service due to damage) are likely to occur to Local Residents & Community as a consequence of the construction of the UWF Related Works.
- There is no potential for impacts to occur to the Electricity Transmission System as a consequence of the UWF Related Works, as the absence of electrical parts and interaction with the transmission system assets.

14.6.2 Summary of UWF Related Works Cumulative Impacts

- No impacts (loss of service due to damage) are likely to occur to Local Residents & Community as a consequence of the construction phase of the UWF Related Works, Upperchurch Windfarm and UWF Grid Connection (which will be concurrent).
- UWF Related Works has no potential to cause impacts to Electricity Transmission System by itself, and therefore cannot have a cumulative effect.

14.6.3 Summary of the Cumulative Impacts with the 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 cumulative impacts of the Other Elements of the Whole UWF Project are summarised here to show the totality of the whole project.

- The UWF Related Works will not contribute to cumulative effects.
- As each of the Other Elements will cause either no impacts or neutral impacts to Local Residents & Community or the Electrical Transmission System, there is no potential for cumulative impacts with each other.

14.6.4 Summary of the Cumulative Impacts with Other Projects or Activities

There is no potential for either UWF Related Works or the Other Elements to cause cumulative impacts to either Local Residents & Community or the Electrical Transmission System with Other Projects or Activities.

14.7 Reference List

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Reference List

Topic
Material Assets (Built Services)

UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 15: Material Assets - Roads

Topic Chapter Authors:

EIAR Coordinator:

January 2019

REFERENCE DOCUMENTS

Topic: **Material Assets (Roads)**

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List of Figures

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

List of Appendices

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

Glossary of Terms

Term	Definition
Congested	A junction or link is considered to be congested when traffic flows are at 85% of the estimated capacity of the junction or link
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.
Traffic Growth	The normal expected growth in traffic over time
Trip	One movement, in or out of the study area by foot, cycle or vehicle
FWD Analysis	A load pulse is produced by dropping a known mass, and is transmitted to the road pavement through a loading plate. The load cell measures the load imparted to the pavement surface and the geophones measure the pavement deflection in response to the load.

List of Abbreviations

Abbreviation	Full Term
TII	Transport Infrastructure Ireland
PD	Ecopower Project Design Environmental Protection Measure developed by members of the EIAR Team
BPM	Ecopower Best Practice Measure developed by members of the EIAR Team
AMM	Ecopower Additional Mitigation Measure developed by members of the EIAR Team
FWD	Falling Weight Deflectometer
UGC	Underground Cables
UWF	Upperchurch Windfarm

15 Environmental Factor: Material Assets (Roads)

15.1 Introduction to the Material Assets (Roads) Chapter

15.1.1 What are Material Assets (Roads)?

The Material Asset - Roads, relates to the local, Regional and National roads which are part of the public road network. In this chapter, Road Users relate to pedestrians, cyclists, and drivers of motor vehicles using the public road network.

15.1.2 Overview of Material Assets (Roads) in the Local Environment

The existing roads environment consists for the most part of lightly trafficked sections of Regional Roads, mainly the R503, along with local roads which are all rural in nature and lightly trafficked and used for local residential access, forestry access and farming access purposes. All of these roads are 2-way roads, with the trafficked pavement varying in width from 3.5 to 5m, with narrow verges, and are generally bounded by low level earthen embankments or hedgerows along either side. The road pavements consist of traditional surface-dressed flexible pavement ('tar and chippings'), with road surface water drained to open drains, generally running along each of the roadsides.

The location of the UWF Related Works in relation to the local road network is illustrated on OSI Mapping on Figure RW 15.1: Location of the UWF Related Works.

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

15.1.3 Sensitive Aspects of the Material Assets (Roads) 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	Public Roads	Section 15.2
Sensitive Aspect No. 2	Road Users	Section 15.3

Each of the above listed Sensitive Aspects are evaluated individually in Sections 15.2 to 15.3 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 15.2 to 15.3. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

15.1.4 Sensitive Aspects excluded from further evaluation

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

Public Roads & Road Users on national and regional roads (not including the R503 or R497)	Evaluated as excluded, due to Neutral impacts: Relates to roads along delivery routes for concrete and aggregate deliveries, other materials deliveries, personnel and turbine component transportation on national and regional roads and local roads, as far as the R503 at Newport from the west, and at Ballycahill from the east, and the UWF Other Activities Haul Route Activity Locations: N69, N18, M7, R498, and the R503 from R498 junction as far as the consented Upperchurch Windfarm Site Entrance No.1. It is considered that National and Regional Road pavements or buried structures are not likely to be affected by the delivery of the construction materials or the larger turbine components, due to the high capacity and good condition of these roads, the commonality of HGVs on these roads, and the absence of any requirement to carry out works to the road surface or to road structures in order to deliver turbine components or construction or operational materials or personnel.
Public Roads & Road Users along the route of any diversions temporarily put in place	Evaluated as excluded, due to Neutral impacts: Relates to local roads along the route of any diversions temporarily put in place due to road closures. It is considered that impacts to local roads or local road users due to any diversions will be Neutral, due to the brief or very short temporary duration of any diversion put in place along with the ability of these local roads to accommodate the additional traffic volumes, which are extremely low in all cases due to the very lightly trafficked nature of the roads in this upland area.

15.1.5 Overview of the Subject Development

The UWF Related Works are the subject development, being the subject of this appeal to An Bord Pleanála. The main parts of the UWF Related Works are identified in Table 15-1 below.

Table 15-1: 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.

15.1.6 The Authors of the Material Assets (Roads) Chapter

This report was written by Eoin Reynolds (Chartered Engineer) of NRB Consulting Engineers and reviewed by David Tarrant, of TLI Group. Eoin Reynolds is a specialist in roads and transportation. Eoin has over 26 years' experience in a wide range of civil engineering projects, although specialising in the area of Traffic & Transportation and Roads Design, and in particular in assessing the infrastructure needs of development. David is a Chartered Engineer and has over 12 years' experience in the Irish construction sector. Currently lead civil design engineer with TLI Group Design office responsible for foundation & structure analysis/design for temporary works, overhead lines, underground cables, access roads and electrical substations.

15.1.7 Sources of Baseline Information

The information sources outlined in Table 15-2 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 15-2: Sources of Baseline Information for Material Assets (Roads)

Type	Source
Consultation	Feedback was received from • Transport Infrastructure Ireland • Roads Department, Tipperary County Council • Members of the public during the Public Consultation and Information Day See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.
Guidelines	• The TII Traffic and Transport Assessment Guidelines (2014) • The TII Design Manual for Roads and Bridges (2013, as amended), • The Department for Transport Traffic Signs Manual (2010), • The TII Specification for the Reinstatement of Openings in National Roads (2013)
Desktop	• North Tipperary County Development Plan 2010 (as varied in 2016)., • POWSCAR 2016, CSO Database • RSA Collision Statistics Database 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 • An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 • An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040
Fieldwork	• Site Visits & Observation of road pavement and boundary conditions • Buried Structures Survey • Falling Weight Deflectometer Survey • Passing Traffic Volume Data collection and assessment (ATC Tube Counts)

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

15.1.7.1 Certainty and Sufficiency of Information Provided

The assessment follows industry-standard procedures, Guidelines and best practices for the Assessment of Traffic and Transportation impacts.

15.1.8 Methodology for Evaluating Effects

TII's Traffic and Transportation Assessment Guidelines (2014), recommends that a threshold assessment & analysis is undertaken. The threshold levels are included in Table 15-3.

Table 15-3: Tii Threshold Analysis

Traffic Management Guidelines Thresholds for Transport Assessments	**Criteria met? Yes/No?**
Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road.	**Yes**, due to the extremely low existing traffic volumes on some of the local roads in the study area.
Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive	No - There are no roads are classed as 'congested' (as per the Tii Guidelines, a junction or link is considered to be congested when traffic flows are at 85% of the estimated capacity of the junction or link)
Residential development in excess of 200 dwellings.	No - Not applicable
Retail and leisure development in excess of 1,000m2.	No - Not applicable
Office, education and hospital development in excess of 2,500m2.	No - Not applicable
Industrial development in excess of 5,000m2.	No - Not applicable
Distribution and warehousing in excess of 10,000m2	No - Not applicable

As one of the criteria in Table 15-3 will be met, a detailed Traffic & Transportation Assessment has been undertaken. The full assessment is appended to the EIA Report, as Appendix 15.1: Traffic and Transportation Assessment Report. The findings of the Traffic and Transport Assessment are summarised in this chapter.

Public Roads

Sensitive Aspect

Material Assets (Roads)

Topic

15.2 Sensitive Aspect No.1: Public Roads

This Section provides a description and evaluation of the Sensitive Aspect - Public Roads.

15.2.1 BASELINE CHARACTERISTICS of Public Roads

15.2.1.1 STUDY AREA for Public Roads

The study area for Public Roads in relation to the UWF Related Works is described in Table 15-4 and illustrated on Figure RW 15.2: Public Roads within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 15-4: UWF Related Works Study Area for Public Roads

Study Area for Public Roads	Justification for the Study Area Extents
Route of concentrated construction traffic on the R503 between Knocknabansha and Ballycahill, and along the local road network between the R503 and the site access points to the UWF Related Works.	Public Roads along routes of concentrated construction traffic or at road works or site access points may be affected by construction traffic movements and road works. Roads remote from the area are not likely to be affected.

15.2.1.2 Baseline Context and Character of Public Roads in the UWF Related Works Study Area

The roads which could be potentially affected by the UWF Related Works and associated haulage are the **Regional Road** R503 (between Newport and Ballycahill) along with the **Local Roads** (designated as "L" Roads); L6185-13, L2264-50, L6188-0, L61881-0, L2264-34, L4139-16, L4138-12 and L4139-0.

Road Pavements: The roads are 2-way roads, with the trafficked pavement varying in width from 3.5 to 5m. The road pavements consist of traditional surface-dressed flexible pavement ('tar and chippings'), with narrow verges and road surface water drained to open drains, generally running along one/both of the roadsides. Comprehensive Falling Weight Deflectometer (FWD) Testing of the local roads was undertaken to determine their load bearing capacity. Testing results are included as Appendix 15.2: FWD Testing. In summary, the FWD testing shows that there is stiff to moderate subgrade support under the roads, and while the local road surfaces were observed during site investigations to be generally in good condition with few potholes, the FWD testing indicates that the pavements themselves are weak. This condition is consistent with rural local roads nationwide. It should be noted that the local roads in the study area are not subject to any vehicular weight restrictions.

Buried Structures: There are 3 No. buried structures under affected roads; concrete culverts routing storm water under the L6188-0 at WW31 and under the L4139-0 at WW12 and a square masonry culvert routing a small stream under the L6185-13 road at WW32.

Road Boundaries: consist of a mix of hedgerows and simple mounded embankments, which are aligned beyond drainage channels that occur in many roadside verges.

Traffic Volumes: Observation based on site visits, and a review of the traffic survey information, confirms that all of the roads within the study area, including the Regional Roads, are very lightly trafficked, and have on average 98.9% spare capacity during peak traffic periods. Further details on traffic volumes and baseline conditions are provided in Appendix 15.1: Traffic & Transport Assessment Report and Appendix 15.3: Site Photographs. Appendices referenced in this topic chapter can be found in Volume C4 EIAR Appendices.

15.2.1.3 Importance of Public Roads

According to the Department of Transport, Tourism and Sport[1], 'the regional and local roads programme is important from economic, social and political perspectives. These roads serve an important economic role in the Irish context and also have valuable social and community functions. These roads are often the sole means of access for local economic activity and play a very important role in Ireland due to:

- the dispersed nature of the population and industrial development;
- the importance of tourism and agriculture as generators of wealth and employment; and
- the increasing attention being given to rural development and urban regeneration'.

The R503 and the R497 are identified as Strategic Roads in the North Tipperary County Development Plan 2010 (as amended). The R503 runs generally in an E-W orientation and links the R497 Regional Road with Limerick city to the west. The R497 runs generally in a N-S orientation and links Nenagh in the North with Tipperary to the South.

The local roads generally serve as access to local residential traffic and are used for farming and rural operations and activities.

The buried structures, listed above, are not considered to be structurally or historically important, and they serve solely as a route to carry storm water run-off and water in small watercourse under the road.

15.2.1.4 Sensitivity of Public Roads

Road pavements and buried structures can be affected by road works involving the excavation of the pavement or the adjacent verge and by increases in traffic, particularly HGV traffic. Road boundaries can be affected by new or widened accesses from the public road network onto the lands beyond.

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

The current condition of the public road pavements and the current good condition of the buried structures is likely to continue with very slow increases in annual traffic volumes, in the region of 1-2% per annum.

15.2.1.6 Receiving Environment (the Baseline + Trends)

The condition of road pavements and buried structures are assumed to be the same as the current condition by the start of the construction stage in 2018. Published annual national traffic growth rates of 1-2% per annum have been applied to the measured 2017 volumes on the affect roads for the year 2020[2], to allow for worst case traffic volumes during a 2019/2020 construction stage.

[1] http://www.dttas.ie/roads/english/regional-and-local-roads

[2] Whilst a 2020 opening year has been selected for the works, in light of the anticipated slow change in the baseline conditions, it should be noted that any required change (of say 1-2 years) in the selection of opening year will have no implications whatsoever for the conclusions of the study due to the very lightly trafficked nature of the affected roads.

15.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

15.2.2.1 Cumulative Evaluation Study Area

15.2.2.1.1 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 Public Roads	Justification for the Study Area Extents
Route of concentrated UWF Related Works construction traffic or roadwork locations on regional roads and on local roads as far as the site access points	Public Roads along routes of concentrated construction traffic or at road works or site access points may be affected by construction traffic movements and road works. Roads remote from the area are not likely to be affected.

The study is illustrated on **Figure CE 15.2: Public Roads within the UWF Related Works Cumulative Evaluation Study Area**.

15.2.2.1.2 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 15.2.2.2.1 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 15-5 and illustrated on Figure CE 15.2: Public Roads within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 15-5: Whole Project Cumulative Evaluation Study Area for Public Roads

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Route of concentrated construction traffic or roadwork locations on regional roads and on local roads as far as the site access points	Public Roads along routes of concentrated construction traffic or at road works or site access points may be affected by construction traffic movements and road works. Roads remote from the area are not likely to be affected.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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

The evaluation of cumulative impacts to Public Roads 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 Public Roads 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. 15).

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 Public Roads.

15.2.2.2.1 Potential for Impacts to Public Roads

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 Public Roads. The results of this evaluation are included in Table 15-6.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure CE 15.2. The baseline character of the areas around these projects is described in Section 15.2.2.3.

Table 15-6: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Elements 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 impacts due to: The road which could be potentially affected by the UWF Replacement Forestry is the **Local Road** L2264-34, from which access will be gained through an existing farm entrance to the afforestation lands. This road is a 2-way road made of traditional surface-dressed flexible pavement ('tar and chippings'), with narrow verges and road surface water drained to open drains, generally running along one/both of the roadside. The road is very lightly trafficked with 99.5% spare capacity, and is not subject to any vehicular weight restrictions. Road boundaries consist of a mix of hedgerows and simple mounded embankments, which are aligned beyond drainage channels that occur in many roadside verges. • No noticeable increase in traffic volumes on the public road network due to the extremely low traffic volumes associated with the UWF Replacement Forestry - the planting stage will generate 1-2 vehicles movements per day over a one-month period, and as a comparative example this level of traffic is substantially less than the daily level of traffic generated by a single residential dwelling. During the growth stage, traffic will be in the region of 2 to 4 vehicle movements per year. • No requirement for roadworks or works to roadside boundaries or buried structures. In relation to the entrance to the UWF Replacement Forestry from the public road; the existing farm entrance will be used. This entrance (labelled EW10 on the drawings and mapping included with the UWF Related Works application to Tipperary County Council) currently

	has sufficient sightlines and set back distances. No changes to the geometry of the existing entrance will be required to accommodate the new native woodland. The only change relates to a change of use from agricultural to agriculture and forestry, which will have no effect on Public Roads.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral Impact/No Impact due to: • Notwithstanding the National and Regional Road network along the turbine component and materials haul routes are scoped out in Section 15.1.4, in relation to the Haul Route Activities, none of the Tii Guideline thresholds (see Table 15-3) are met, and therefore further analysis is not required - the traffic increases as a result of the Haul Route Activities (tree trimming, laying of matting, street furniture removal), will be in all cases considerably less than 1% of the current traffic volumes on these roads and as a result will be Neutral, given that the normal day-to-day variation in traffic conditions can be as much as 10%. In addition, tree trimming is regularly carried out to roadside boundaries and is a commonplace occurrence on the public road network, and specifically in relation to the Clarina junction on the N69 outside Limerick, the turbine component delivery route across the side of the roundabout at Clarina Junction will be provided through the use of a 'geogrid' material, which will be used to facilitate the use of the roundabout without disturbing the soil or causing damage to the roundabout.. • Upperchurch Hen Harrier Scheme & Monitoring Activities & Overhead Line Activities: no works to the road network or road boundaries form part of these activities, and taking into consideration the extremely low volumes of traffic associated with these activities, and the brief duration of any public road use, no effects to Public Roads are likely to occur.

15.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

15.2.2.3.1 Element 1: UWF Grid Connection

The roads which could be potentially affected by the UWF Grid Connection works and associated haulage are the Regional Roads R503 (between Newport and Knocknabansha), and between Knocknabansha and Ballycahill (haulage only) along with the Local Roads (designated as "L" Roads); L-2166-0, L2264-50, L6188-0.

Buried structures**:** There are 46 No. buried structures (all culverts) under the public road along the route of the 110kV UGC: 41 No. buried structures (culverts) under the R503 road, 0 (zero) No. buried structures under the L2166-0 road, 3 No. buried structures (3 No. culverts) under the L2264-50 road and 2 No. buried structures (2 No. culverts) under the L6188-0 road. In addition there are 12 No. bridges along the route of the 110kV UGC on the R503. The buried structures in the study area were inspected by engineers from TLI Group during site investigations in January 2019. It is considered that these road structures are currently in good condition and will be capable of supporting the increased traffic loading associated with the construction works. However up to 26 No. culverts may potentially require replacement during cable trenching works.

Public Roads
Sensitive Aspect
Material Assets (Roads)
Topic

Public Roads

Road Boundaries: consist of a mix of hedgerows and simple mounded embankments, which are aligned beyond drainage channels that occur in most roadside verges.

Traffic Volumes: Observation based on site visits, and a review of the traffic survey information, confirms that all of the roads within the study area, including the Regional Roads, are very lightly trafficked, and have on average 95.2% spare capacity during peak traffic periods.

Overlap of UWF Grid Connection with the UWF Related Works Cumulative Evaluation Study Area: relates to the R503 (at Knocknabansha) to the junction with the L2264-50 and along with the Local Roads (at Knockmaroe) L2264-50 and L6188-0.

Sensitive Aspect

15.2.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 15.2.2.2.1

15.2.2.3.3 Element 4: Already Consented Upperchurch Windfarm

The regional and local roads associated with the UWF Related Works will also be used for access to the Upperchurch Windfarm.

Consideration of the Passage of Time: The makeup and number of road users of the public road network in the vicinity of Upperchurch Windfarm has not changed since the preparation of the 2013/2014 planning documents and assessments. It is considered therefore that the information in the 2013 EIS, is relevant to the cumulative evaluations in this Revised EIAR for UWF Related Works.

15.2.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 15.2.2.2.1

15.2.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 15.2.2.1.

Material Assets (Roads)

Topic

15.2.3 PROJECT DESIGN MEASURES for Public Roads

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 15-7 are relevant to the Environmental Factor, Material Assets (Roads), and in particular to the sensitive aspect **Public Roads**.

Table 15-7: UWF Related Works Project Design Measures relevant to Public Roads

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.

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 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.

Public Roads

Sensitive Aspect

15.2.4 EVALUATION OF IMPACTS to Public Roads

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) - Public Roads.

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

Table 15-8: 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)*
Damage to road boundaries (construction stage)	*Damage road culverts (construction stage)*
Damage to road pavements (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 15.2.4.1 to 15.2.4.2.**

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 15.2.4.3.

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Topic

15.2.4.1 Impact Evaluation Table: Damage to Road Boundaries

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: Trenching works, site access Cumulative Impact Source: Trenching works, site access Impact Pathway: Road Boundary Impact Description: Road boundaries consist of existing hedges and roadside embankments and walls, and are important for road safety and contribute to the character of an area. Part of the road boundary will be removed at site access points and in other locations the underground cables routes are through roadside boundaries and trenching works will be involve the removal of a 5m section of the boundary at each of these locations. At temporary entrance or widening locations, the roadside boundary will be reinstated along its original alignment, following the completion of construction works in the area. Impact Quality: Negative	
Evaluation of the Subject Development Impact – Damage to Road Boundaries	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: No works to road boundaries are required for Realigned Windfarm Roads, Telecoms Relay Pole or UWF Related Works Ancillary Works. 14 No. temporary entrances off the public road for the Internal Windfarm Cabling trenching works, 10 No. of which will be newly opened, and 4 No. will comprise widening of existing farm gateways. 5 No. temporary entrances off the public road will be opened or widened to accommodate the Haul Route Works, 2 No. of which are through existing farm gates. The Haul Route Works will involve the temporary removal of 1035m and the permanent removal of 25m of road boundaries.	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation: • The temporary loss of road boundaries at temporary site access points, • The reinstatement of all temporary entrances and opening of roadside boundaries to the satisfaction of Tipperary County Council • The reinstatement of all verges and roadside drainage following the completion of construction works in an area.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: There is no potential for cumulative impacts with UWF Grid Connection, as the 110kV UGC will not require any temporary or permanent removal of roadside boundaries for the 110kV UGC. UWF Related will requires 13 No. temporary entrances through roadside boundaries, generally in the Upperchurch Windfarm area. Upperchurch Windfarm requires the widening of 11 no. permanent site entrances through existing farm gates. With the exception of the L2264-0 and the R503, roadside boundaries along stretches of individual roads will be affected by boundary removal (temporary or permanent) from both UWF Related Works and Upperchurch Windfarm. No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.	
Significance of the Impact: Slight	
Rationale for Impact Evaluation:	

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Sensitive Aspect

- Temporary loss or permanent loss/change to road boundaries will have a negative and observable effect, however the implications to the public road network will be small given the very low volumes of traffic on the roads.
- The opening of roadside boundaries, reinstatement of all temporary entrances, verges and roadside drainage for UWF Related Works to the satisfaction of Tipperary County Council
- The loss of roadside boundaries limited to the Upperchurch Windfarm main site entrance, albeit that the roadside boundary will be reinstated behind the sightlines.
- As per the Upperchurch Windfarm Grant of Permission 2014: it is considered that, subject to compliance with the conditions set out below, the development would not seriously injure the amenities of the area or of property in the vicinity, and would be acceptable in terms of traffic safety and convenience.

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

Element 1: UWF Grid Connection

Impact Magnitude: The UWF Grid Connection element consists of 1 No. permanent site entrance.A permanently widened entrance will be provided at the existing field entrance for the Mountphilips Substation, off the L2166-0. In accordance with Tii's DMRB DN-Geo-03060, sightlines of 160m will be provided according to drawing SK-004 at the permanently widened entrance, through the removal and set-back of roadside boundaries. The entrance gates will also be set back 4.8m from the road edge. In total 180m of roadside boundary will be permanently removed and reinstated behind sightlines.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The use of one new permanent entrances through existing farm gate,
- The reinstatement of road boundaries behind sightlines at the widened entrance,
- The reinstatement of all verges and roadside drainage following the completion of construction works in an area.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 15.2.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: The widening of 11 no. permanent site entrances through existing farm gates along the R503, L4139-0, L4138-12, L6188-0, L2264-50 and L6185-13 roads. As per the EIS 2013: All construction entrances have been designed having regard to the North Tipperary County Development Plan and the National Roads Authority Geometric Design of Major/Minor Priority Junctions and Vehicular Access to National Roads. Widening works at these locations will be managed under the Traffic Management Plan for the Upperchurch Windfarm set out in the RFI 2013.

Significance of the Impact: Not be Significant

Rationale for Impact Evaluation:As per the Grant of Permission 2014: it is considered that, subject to compliance with the conditions set out below, the development would not seriously injure the amenities of the area or of property in the vicinity, and would be acceptable in terms of traffic safety and convenience.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 15.2.2.2.1*

Evaluation of Other Cumulative Impacts – Damage to Road Boundaries

Whole UWF Project Effect

Cumulative Impact Magnitude:
The roadside boundaries affected by the UWF Grid Connection (1), UWF Related Works (12 of 13) and Upperchurch Windfarm (10 of 11) are for the most part on local roads.

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Approximately half of roadside boundary removal is temporary and the boundaries will be reinstated along the original alignment following completion of construction works. The remaining entrances will be permanently widened, however the extent of widening is small at all but one of these entrances – where longer sections of public road boundary will be removed to provide sightlines at the main entrance Upperchurch Windfarm (at Site Entrance no.1). Sightlines will also be provided, by removing roadside boundary, for the entrance to Mountphilips Substation, however the affected local road, L2166-0, is located at a substantial distance (c.30km) from the Upperchurch area.
Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • Temporary loss or permanent loss/change to road boundaries will have a negative and observable effect, particularly in the Upperchurch area, however the implications to the public road network will be small given the very low volumes of traffic on the local roads. • The opening of roadside boundaries, reinstatement of all temporary entrances, verges and roadside drainage for UWF Related Works to the satisfaction of Tipperary County Council; • The separation distance between the Upperchurch Windfarm/UWF Related Works area and the Mountphilips Substation; • The loss of roadside boundaries limited to the Upperchurch Windfarm main site entrance, albeit that the roadside boundary will be reinstated behind the sightlines. • As per the Upperchurch Windfarm Grant of Permission 2014: it is considered that, subject to compliance with the conditions set out below, the development would not seriously injure the amenities of the area or of property in the vicinity, and would be acceptable in terms of traffic safety and convenience..

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Public Roads with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 15.2.2.1).

15.2.4.2 Impact Evaluation Table: Damage to Road Pavement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Trenching works, site access, construction traffic
Cumulative Impact Source: Trenching works, site access, construction/delivery traffic
Impact Pathway: Roads

Impact Description: Road pavements comprise the hard surfacing of the road, along with the supporting subgrade underneath. The roadside verge and drainage is also an integral part of the road, and influences the quality of road edges and road condition. Road pavements will be affected by excavations of the road surface during trenching works. Additional construction traffic along local roads and the use or opening of temporary site access points can lead to deterioration of the road edges at site access points and along haulage routes. Additional traffic volumes can also affect the integrity of road pavements. It is considered that no effects to the regional road pavements are likely to occur, due to the current good condition and capacity of these roads. The developer is committed to repairing any sections of roads damaged by construction works or construction traffic, to the satisfaction of Tipperary County Council.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Damage to Road Pavements

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude: Haul Route Works will involve the removal of a total of 1710m of verges on the R503, L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 roads, hardcore will be laid and compacted on these verge areas, and following construction, soil will be laid over the hardcore during reinstatement of the verge.
Internal Windfarm Cables will involve a total of 45m of trench excavations in the road pavement on the L4139-0, L4139-16, L6188-0, L61881-0, L6185-13, L2264-34, L2264-50. Small sections of verge will be also being removed and overlaid with hardcore at the 9 No. temporary entrances for the Internal Windfarm Cabling and Haul Route Works.
As per Appendix 15.1: Traffic and Transport Assessment Report, the additional construction traffic associated with the UWF Related Works will have a negligible effect on the network capacity and operation of the roads within the study area, as in excess of 98.9%, on average, of the capacity of each of the roads will remain available during the construction stage.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The temporary duration of the works,
- The lightly trafficked nature and extent of available capacity on all roads
- The reinstatement of trenching locations within road pavements in accordance with the Tii Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads
- The repair of any damage to road pavements along concentrated construction traffic haul routes with full width surface dressing on any sections with a FWD measured SCI rating of 250 or more.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effects of UWF Related Works with UWF Grid Connection along the L2264-50, 6188-0 and a 30m section of the R503 at Knocknabansha where UWF Related Works Haul Route Works overlap with the UWF Grid Connection 110kV UGC along these roads. The cumulative impact with UWF Grid Connection relates to the additional 3.5km of cable trenching in the road surface associated with the 110kV UGC trench.

Cumulative impacts with the Consented Upperchurch Windfarm relates to additional traffic volumes travelling on the roads, there are no additional road works associated with the Upperchurch Windfarm.
No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Road works associated with UWF Related Works will not be carried out at the same time as UWF Grid Connection works on the L2264-50, with the 110kV UGC trench being reinstated (temporary surface) on a daily basis.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The temporary duration of the works,
- The lightly trafficked nature and extent of available capacity on all roads
- The reinstatement of trenching locations within road pavements in accordance with the Tii Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads
- The repair of any damage to road pavements along concentrated construction traffic haul routes with full width surface dressing on any sections with a FWD measured SCI rating of 250 or more.
- The scheduling of works to avoid roadworks from both UWF Related Works and UWF Grid Connection occurring at the same time, on the L2264-50 and L6166-0.

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

Element 1: UWF Grid Connection

Impact Magnitude: The 110kV UGC is routed along the L2166-0 (2.26km), R503 (23.14km), L2264-50 (1.93km) and L6188-0 (0.33km). The construction of the 110kV UGC will involve the excavation of a trench c.1.25m deep and 0.6m wide in the public road pavement. 18m of verge will be removed and overlaid with hardcore at the 1 No. permanent site entrance. As per Appendix 15.1: Traffic and Transport Assessment Report, the additional construction traffic associated with the UWF Grid Connection on the above listed will have a negligible effect on the network capacity and operation of the roads within the study area, as in excess of 95.2%, on average, of the capacity of each of the roads will remain available during the construction stage.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The temporary duration of the works,
- The higher value of the regional road R503,
- The lightly trafficked nature and extent of available capacity on all roads
- The reinstatement of trenching locations within road pavements in accordance with the Tii Guidelines for the Opening, Backfilling and Reinstatement of Openings in Public Roads
- The repair of any damage to road pavements along concentrated construction traffic haul routes with full width surface dressing on any sections with a FWD measured SCI rating of 250 or more.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 15.2.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: There are no works planned to the public road network. Any damage to the network due to the passage of construction traffic will be repaired in accordance with Condition 23. of the Grant of Permission 2014. Hardcore will be laid on verges at the 11 no. site entrances from the local road network and at the 1 no. entrance (Site Entrance No.1) on the R503.

Significance of the Impact: Not be Significant

Rationale for Impact Evaluation:

- Planning Conditions requiring all roads to be reinstated to the satisfaction of Tipperary Co Co, and

- FWD Testing that will ensure that the strength and stability of the roads is maintained and reinstated.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 15.2.2.2.1*

Evaluation of Other Cumulative Impacts – Damage to Road Pavements

Whole UWF Project Effect

Cumulative Impact Magnitude: UWF Grid Connection will involve permanent laying of hardcore on 18m of road verge at Mountphilips Substation entrance, and trench excavations along 27.7km of road pavement between the Mountphilips Substation entrance in Coole and the Consented UWF Substation in Knockcurraghbola Commons. In the Upperchurch Windfarm area, the UWF Related Works will involve trench excavations along 45m of road pavement and temporary laying of hardcore on 1,755m of road verge. Upperchurch Windfarm will involve will involve works on R503 road verge at the main Site Entrance and 11 no. smaller entrances off the local road network in the area.

The road pavements affected by the UWF Grid Connection works along the L2166-0 and the R503 which are for the most part located away from UWF Related Works or Upperchurch Windfarm traffic. There are only two roads which will be subject to construction traffic relating to the three elements, – the L2264-50 and L6188-0. Two local roads, L4138-12 and L4139-0, will experience a noticeable (albeit still very low) increase in traffic with works for both the UWF Related Works and Upperchurch Windfarm in Shevry. Currently these roads are very lightly trafficked, and worst-case construction works are likely to double the traffic numbers on the L6188-0 and the L4139-0 roads. The pavement strength, measured during FWD testing on these four roads varied from good to bad.

Significance of the Cumulative Impact: ranges from Imperceptible to Slight:
Slight significance on the R503, L2264-50, L6188-0, L4138-12 and the L4139-0 local roads in the Knockmaroe/Knockcurraghbola/Shevry areas, and **Imperceptible significance** on other Public Roads.

Rationale for Cumulative Impact Evaluation:

- The good condition but weak pavement strength of the local roads, including the L2264-50, L6188-0, L4138-12 and the L4139-0 local roads,
- The temporary duration of the works,
- The lightly trafficked nature and extent of available capacity on all roads
- The reinstatement of trenching locations within road pavements in accordance with the DMRB Trench Reinstatement Guidelines and to the satisfaction of Tipperary County Council
- The repair of any damage to these four roads with full width reinstatement on any damaged sections.
- The repair of any damage to other road pavements along concentrated construction traffic haul routes for the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm, with full width surface dressing of any sections of roads with an FWD measured SCI of 250 of more.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Public Roads with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 15.2.2.1).

15.2.4.3 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 15-9 below.

Table 15-9: Description and Rationale for Excluded Impacts to Public Roads

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				
Trenching works, site access, construction traffic	1, 2	Road	Damage road culverts	Rationale for Excluding: no likely impact UWF Grid Connection – Neutral impact: There are 46 No. buried structures under the public roads along the route of the 110kV UGC. These structures were visually inspected by engineers from TLI Group in January 2019 and were considered by these engineers to be in good condition, therefore they will not be affected by the additional construction traffic associated with the UWF Grid Connection. However, potentially up to 26 no. of these may need to be replaced during 110kV UGC trenching works. It is considered that as any culverts which need to be replaced, will be replaced with higher specification culverts, that the impact to the public road network will be neutral. There are no works at public road structures associated with the Upperchurch Windfarm. UWF Related Works – no likely impacts: The 3 No. buried structures at WW12, WW31 (both culverts) and WW32 (small stone arch structure), WW32 does not require any works, therefore there no potential for direct effects to this structure. Both WW12 and WW31 will require a 1m extension of the culvert on one side, this work will be carried out with minimal interference to the existing structure in accordance with Tii Specification for Roadworks, detailed design will be finalised following consultation with the Tipperary County Council District Engineer prior to these extension works. All three structures (WW12, WW31 and WW32, have been inspected by Wind Prospect in 2017 who found that the structures are in good condition and are not subject to vehicular weight restrictions, therefore it is considered that these structures will not be affected by the additional construction traffic associated with the UWF Related Works and the Upperchurch Windfarm.
Operational Stage				
Rationale for Excluding: Neutral effect: With regard to the UWF Grid Connection: The Mountphilips Substation, will be remotely monitored and secured, and will be inspected on a monthly basis. Each of the Joint Bays along the 110kV UGC will be tested (via manhole covers) and the ground above the 110kV UGC will be visually inspected annually. In total, it is expected that access to the joint bays/substation will occur over a total c.13 per year, most likely using vans, will be associated with the routine operation of the UWF Grid Connection. Any infrequent maintenance (if at all) at Joint Bay				

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

locations may require the use of larger machinery and plant for very short periods of time (1 – 14 days). As the traffic volumes associated with the operational stage are negligible, no damage to road pavements are likely to occur. Any requirement for road works, are expected to be limited to joint bay locations, and will be very infrequent, if they occur at all. The Joint Bay area will be reinstated to the satisfaction of Tipperary County Council, and any impacts are expected to be Neutral.

With regard to the UWF Related Works: The Telecoms Relay Pole and the ground above the Internal Windfarm Cables will have one inspection per year, the Realigned Windfarm Roads will be visually inspected on a monthly basis during windfarm site inspections. Each inspection will ordinarily be by way of a normal car or small works van. However, it may require the use of larger machinery and plant for brief durations (c.1 day) to maintain the Realigned Windfarm Roads periodically during the operational stage. As these traffic volumes associated with the operational stage are negligible, no damage to road pavements are likely to occur. No works to road pavements or buried structures will be required during the operation of the UWF Related Works. With the exception of Haul Route Works, no works to road boundaries will be required. At Haul Route Works locations, the roads boundaries may need to be adjusted temporarily at some stage in the future in order to accommodate the transport of turbine components to and from the windfarm. It is considered that this will occur very infrequently during the operational stage. It is intended that the hard-core surface, which was installed during the construction works, will be left in-situ under the reinstated verges and boundaries and can be uncovered in the event of requiring its reuse. The resulting duration of any works at Haul Route Works locations will be brief, reversible with reinstatement, and are typical of commonly occurring road works on Irish roads, therefore any impacts to road boundaries will be Neutral.

With regard to the Upperchurch Windfarm: 1-2 small vehicle movements (van or four wheel drive) per day associated with the maintenance of the windfarm, and few if any larger vehicle movements. The only larger vehicles would be those associated with the windfarm are the replacement of turbine parts, which may be required infrequently during the operational stage. In any case the use of larger vehicles will involve very small numbers of larger vehicle movements, all of which will comply with axle loadings, and vehicle movements associated with large turbine components will take place outside of peak hours. Due to the very low traffic volumes associated with Upperchurch Windfarm, which are less than those associated with a residential dwelling and the absence of roadworks or works to roadside boundaries or buried structures, the effects to Public Roads will be Neutral.

Decommissioning Stage

Rationale for Excluding: No potential for effects/Neutral effects.
The UWF Grid Connection will not be decommissioned, therefore there is no potential for effects.

The traffic volumes associated with those parts of the UWF Related Works which will be decommissioned (Telecoms Relay Pole, cables from the Internal Windfarm Cables) will result in minimal traffic condition changes which will not be noticeable on the local roads. Haul Route Works: It is not known at this time whether the turbine components will be broken up and transported off-site in smaller parts for recycling, or if some or all of the turbine components will be transported offsite for reuse. Should turbine components be transported offsite, then the road verges/boundaries at Haul Route Works locations will be widened once more, similar to infrequent widening during the operational stage, to facilitate the transport of turbine components (if needed). These works will not have any effect on road pavements, and any boundaries removed will be reinstated immediately afterwards. Therefore, it is considered that the decommissioning works and activities associated with the UWF Related Works will have a neutral effect on Public Roads.

In relation to the Upperchurch Windfarm, no works or damage to public road pavements or to public road boundaries are expected during any decommissioning activities, therefore there is no potential for impacts to Public Roads from this Element.

15.2.5 Mitigation Measures for Impacts to Public Roads

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 Public Roads as a consequence of the UWF Related Works.

15.2.6 Evaluation of Residual Impacts to Public Roads

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures were required, and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Public Roads above (Section 15.2.4) – i.e. **no significant adverse impacts**.

15.2.7 Application of Best Practice and the EMP for Public Roads

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 **Public Roads,** by the authors of this topic chapter, using industry best practice:

RW-BPM-30	Traffic Management Measures

This Best Practice Measure is included in full at the end of this topic chapter, and also forms part of the Traffic Management Plan for the UWF Related Works.

The Traffic Management Plan (TMP) for the public roads will be a key construction contract document, the implementation of which will reduce possible impacts which may occur due to the presence of construction traffic and works on the public roads, in particular the Local Roads in the vicinity. It is a particular objective of this plan to repair damage to the road surface and reinstate roadside boundaries. The Traffic Management Plan forms part of the UWF Related Works Environmental Management Plan, which is included as Volume D with the planning application.

Public Roads

Sensitive Aspect

15.2.8 Summary of Impacts to Public Roads

A summary of the Impact to Public Roads is presented in Table 15-10.

Table 15-10: Summary of the impacts to Public Roads

Impact to Public Roads:	**Damage to Road Boundaries**	**Damage to Road Pavements**
Evaluation Impact Table	*Section 15.2.4.1*	*Section 15.2.4.2*
Project Life-Cycle Stage	Construction	Construction
UWF Related Works *Direct or indirect impacts*	**Imperceptible**	**Imperceptible**
UWF Related Works *Cumulative impacts*	**Slight**	**Imperceptible**
Element 1: UWF Grid Connection	Imperceptible	Slight
Element 3: UWF Replacement Forestry	No Impact - Evaluated as Excluded, see Section 15.2.2.2.1	
Element 4: Upperchurch Windfarm	Not be Significant	Not be Significant
Element 5: UWF Other Activities	Neutral Impact/No Impact - Evaluated as Excluded, see Section 15.2.2.2.1	
Cumulative Impact:		
Whole UWF Project Effect	**Slight**	**Ranges from Imperceptible to Slight**

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Public Roads with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 15.2.2.1).

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.

Material Assets (Roads)

Topic

15.3 Sensitive Aspect No.2: Road Users

This Section provides a description and evaluation of the Sensitive Aspect - Road Users.

15.3.1 BASELINE CHARACTERISTICS of Road Users

15.3.1.1 STUDY AREA for Road Users

The study area for Road Users in relation to the UWF Related Works is described in Table 15-11 and illustrated on Figure RW 15.3: Road Users within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 15-11: UWF Related Works Study Area for Road Users

Study Area for Road Users	Justification for the Study Area Extents
Route of concentrated construction traffic on the R503 between Knocknabansha and Ballycahill, and along the local road network between the R503 and the site access points to the UWF Related Works.	Road Users along routes of concentrated construction traffic or at road works or site access points may be affected by construction traffic movements and road works. Road Users, who have acceptable alternative routes are not likely to be affected

15.3.1.2 Baseline Context and Character of Road Users in the UWF Related Works Study Area

Road Users relate to local road users, vehicular through traffic (road users commuting or passing through the area), tourists and pedestrians/cyclists. These road users use the roads for commuting to work or school, for agricultural/forestry access, for local and regional business or leisure purposes.

In relation to commuting to work or school, data from the Central Statistics Office (POWSCAR 2016) indicates that the majority (c.74%) of road users in the Electoral Districts associated with the UWF Related Works, travel to work in a car, van or lorry and 2% walk. Data for people travelling to school or college shows that the majority are driven to school/college (40%), 4% drive themselves, 43% use public transport and 6% walk or cycle .

Traffic count surveys were carried out for a 24-hour period at 9. No locations. The traffic count survey, in addition to observations during site investigations, confirms that the roads in the study area have low traffic volumes and are not congested roads. The survey results also indicate that on average 97.5% of traffic counted comprised cars or vans, and only 0.8% comprises heavy vehicles which would include tractors, buses, articulated and rigid trucks, and 1.7% comprises bicycles or motorcycles. Further details on the traffic count survey is included in Appendix 15.1: Traffic & Transport Assessment Report.

It is assumed that road users along the two regional roads mainly comprise people travelling to work or school/college, or travelling to shops and businesses along the R503 and the R497, as these roads are identified as commuter routes and linking Thurles with Limerick, and Nenagh with Tipperary Town, respectively. It is assumed that road users on local roads are travelling to work, schools, local shops and farms.

It is also assumed that tourists use both of the regional roads, the R503 and the R497, to travel between the towns mentioned above, and potentially, to access a number of walking/cycling routes that exist in the study area. The R503 and R497 are also both designated scenic routes in Tipperary North County Development Plan. The waymarked walking routes that exist in the UWF Related Works Study Area consist of the Eamon a Chnoic Loop and the Ormond Way walking route (currently being developed). Part of the Ormond Way walking route (currently under development) is along the L4139-0. There is also a waymarked cycle route,

the Ormond Way Cycle, part of which is routed along the L2264-50 and L2264-34 (locally called the Borrisoleigh Road) through Knockmaroe and Foilnaman. These walks and cycle route are identified on Figure CE 15.3: Road Users within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures). Both the CSO data and the traffic count surveys show a very low usage of the road network by cyclists.

Road Safety: The traffic data collected confirmed that the traffic speeds are generally maintained well within the posted speed limits (i.e. less than 80kph which is generally the speed limit on the local roads). A review of the Road Safety Authority on-line collision statistics demonstrates that the local and regional roads in the study area do not have a significant history of accidents.

Public Transport: A rural transport bus service provides services between Upperchurch and Klicommon to the larger towns in in Tipperary.

15.3.1.3 Importance of Road Users

Road Users are of importance as members of local communities, farmers and forestry workers, other workers, commuters to and between urban areas and visitors. Road Users are required to adhere to the Rules of the Road and to use the roads in accordance with the Road Traffic Act (as amended).

15.3.1.4 Sensitivity of Road Users

Road Users could be sensitive to changes in road use conditions such as substantial increases in traffic volumes, particularly HGVs; presence of roadworks and traffic management measures, such as stop-go systems; and a reduction in road pavement quality which could either increase journey times or reduce road safety. Cyclists or walkers could also be intimidated by the presence of heavy goods vehicles, particularly on narrow roads.

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

Local road conditions are unlikely to change significantly in nature and character with annual traffic growth on the local roads of 1-2% per annum.

15.3.1.6 Receiving Environment (the Baseline + Trends)

The number of Road Users in the receiving environment is assumed to be the measured 2017 baseline traffic and road conditions. Published annual national traffic growth rates of 1-2% per annum have been applied to the measured 2017 volumes on the affect roads for the year 2019[3], to allow for worst case traffic volumes during a 2018/2019 construction stage.

[3] Whilst a 2019 opening year has been selected for the works, in light of the anticipated slow change in the baseline conditions, it should be noted that any required change (of say 1-2 years) in the selection of opening year will have no implications whatsoever for the conclusions of the study due to the very lightly trafficked nature of the affected roads.

15.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

15.3.2.1 Cumulative Evaluation Study Area

15.3.2.1.1 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 Road Users	Justification for the Study Area Extents
Route of concentrated construction traffic on the R503 between Knocknabansha and Ballycahill, and along the local road network between the R503 and the site access points to the UWF Related Works.	Road Users along routes of concentrated construction traffic or at road works or site access points may be affected by construction traffic movements and road works associated with both UWF Related Works and Other Elements or Other Projects or Activities. Road Users, who have acceptable alternative routes are not likely to be affected

The study is illustrated on **Figure CE 15.3: Road Users within the UWF Related Works Cumulative Evaluation Study Area**.

15.3.2.1.2 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 15.3.2.2.1 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 15-12 and illustrated on Figure WP 15.3: Road Users within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 15-12: Whole Project Cumulative Evaluation Study Area for Road Users

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Route of concentrated construction traffic or roadwork locations on regional roads and on local roads as far as the site access points	Road Users along routes of concentrated construction traffic or at road works or site access points may be affected by construction traffic movements and road works. Road Users, who have acceptable alternative routes are not likely to be affected
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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

The evaluation of cumulative impacts to Road Users 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 Road Users 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. 15).

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 Road Users.

15.3.2.2.1 Potential for Impacts to Road Users

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 Road Users. The results of this evaluation are included in Table 15-13.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 15.3. The baseline character of the areas around these projects is described in Section 15.3.2.3.

Table 15-13: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Elements 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 impacts are likely to occur due to Access into the UWF Replacement Forestry lands will be through an existing farm entrance on the Local Road L2264-34. This road is a 2-way road which is very lightly trafficked with 99.5% spare capacity. There are adequate sightlines at this existing entrance. Part of the Ormond Way cycle route is along the L2264-34. • No increase in journey times due to the absence of any road works and the extremely low volumes of traffic associated with the UWF Replacement Forestry - the planting stage will generate 1-2 vehicles movements per day over a one-month period, and as a comparative example this level of traffic is substantially less than the daily level of traffic generated by a single residential dwelling. During the growth stage, traffic will be in the region of 2 to 4 vehicle movements per year. • No reduction in road safety due to the adequacy of sightlines at the existing access point.
Element 4: Upperchurch Windfarm	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral Impacts or No Impacts due to: • Notwithstanding the National and Regional Road network along the turbine component and materials haul routes are scoped out in Section 15.1.4, in relation to the Haul Route Activities, none of the Tii Guideline thresholds (see Table 15-3) are met, and therefore further analysis is not required - the traffic increases as a result of the Haul Route Activities (tree trimming, laying of matting, street furniture removal), will be in all cases considerably less than 1% of the current traffic volumes on these roads and as a result will have no effect on Road Users, given that the normal day-to-day variation in traffic conditions

	can be as much as 10%. In addition, tree trimming is a commonplace occurrence on the public road network. Although street furniture, including safety signs, will be removed as part of the Haul Route Activities, these signs will be removed immediately prior to turbine component transportation, during off peak hours, and replaced immediately after the convoy passes by and it is considered that the brief removal of street furniture will not affect the safe use of the roads by Road Users. • Upperchurch Hen Harrier Scheme & Monitoring Activities & Overhead Line Activities: no works to the road network or road boundaries form part of these activities, and taking into consideration the extremely low volumes of traffic associated with these activities, and the brief duration of any public road use, no effects to Road Users are likely to occur.

15.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

Road Users relate to local road users, vehicular through traffic (road users commuting or passing through the area), tourists and pedestrians/cyclists. These road users use the roads for commuting to work or school, for agricultural/forestry access, for local and regional business or leisure purposes.

In relation to commuting to work or school, data from the Central Statistics Office (POWSCAR 2016) indicates that the majority of road users in upland area, travel to work in a car, van or lorry, whereas a small minority of people use public transport (mainly buses), walk or cycle. Data for people travelling to school or college shows that the majority are driven to school/college. Detailed POWSCAR data is included in Appendix 15.1: Traffic and Transport Assessment Report.

It is assumed that road users along the regional road in the area (R503) mainly comprise people travelling to work or school/college, or travelling to shops and businesses along the R503, as this road is identified as a commuter route linking Thurles with Limerick. It is assumed that road users on local roads are travelling to work, schools, local shops and farms.

It is also assumed that tourists use the regional road, the R503, to travel between the towns mentioned above, and potentially, to access a number of walking/cycling routes that exist in the study area. The R503 is a designated scenic route in Tipperary North County Development Plan.

Road Safety: The traffic data collected confirmed that the traffic speeds are generally maintained well within the posted speed limits (i.e. less than 80kph which is generally the speed limit on the local roads). A review of the Road Safety Authority on-line collision statistics demonstrates that the local and regional roads in the study area do not have a significant history of accidents, limited to 1 serious accident on roads in the area in the last 10 years (Newport, 2011) See Appendix 15.1 for more details on safety statistics.

Public Transport: A rural transport bus service provides services between Upperchurch, Klicommon and Rear Cross to the larger towns in in Tipperary. Rear Cross is also along the Bus Éireann Limerick to Dundrum service route.

15.3.2.3.1 Element 1: UWF Grid Connection

The roads which could be potentially affected by the UWF Grid Connection works and associated haulage are the Regional Road R503 (between Newport and Ballycahill), along with the Local Roads (designated as "L" Roads); L2166-0, L2264-50, L6188-0.

Traffic count surveys were carried out for a 7-day period at 7. No locations. The traffic count survey, in addition to observations during site investigations, confirms that the roads in the study area have low traffic volumes and are not congested roads. The vast majority of traffic counted comprised cars or vans. Both the

traffic count surveys and the CSO POWSCAR data show a very low usage of the road network by cyclists. Further details on the CSO data and traffic count survey results are included in Appendix 15.1.

The waymarked walking routes that exist in the study area consist of the Slievefelim Way waymarked walk and the waymarked cycle route, Ormond Way Cycle, part of which is routed along the L2264-50 (locally called the Borrisoleigh Road) through Knockmaroe. These walks and cycle route are identified on Figure WP 15.3. All of these trails include public road sections to some degree; the Slievefelim Way is routed along the R503 for c. 1.3km just outside Rear Cross village and all of the Ormond Way Cycle route is along public roads.

Overlap of UWF Grid Connection with the UWF Related Works Cumulative Evaluation Study Area: relates to the R503 (at Knocknabansha) to the junction with the L2264-50 and along with the Local Roads (at Knockmaroe) L2264-50 and L6188-0. Construction traffic for both projects will also use the regional R503 road between Knocknabansha and Borrisoleigh.

15.3.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 15.3.2.2.1

15.3.2.3.3 Element 4: Already Consented Upperchurch Windfarm

The baseline characteristics for Road Users described under UWF Related Works above, also applies to the road users which will be travelling on roads associated with Upperchurch Windfarm deliveries.

Consideration of the Passage of Time: Although road traffic increases at approximately 1 – 2% per annum, due to the very lightly nature of the roads and the extent of available capacity on all roads, it is considered that there is not a material change from traffic conditions at the time of the Upperchurch Windfarm 2013 EIS or 2014 assessment, and therefore the information in the 2013 EIS remains relevant to the cumulative evaluations in this Revised EIAR for UWF Related Works

15.3.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 15.3.2.2.1

15.3.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 15.3.2.1.

15.3.3 PROJECT DESIGN MEASURES for Road Users

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 15-14 are relevant to the Environmental Factor, Material Assets (Roads), and in particular to the sensitive aspect **Road Users**.

Table 15-14: UWF Related Works Project Design Measures relevant to Road Users

PD ID	Project Design Environmental Protection Measure (PD)
PD01	All construction works will be carried out during daylight hours.
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.
PD03	Construction works in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Grid Connection or Upperchurch Windfarm.

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 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.

Road Users

Sensitive Aspect

15.3.4 EVALUATION OF IMPACTS to Road Users

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) - Road Users.

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

Table 15-15: 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)*
Increased Journey Times (construction stage)	*Increased Risk of Road Accidents (construction stage)*
	Interrupted or disrupted access to property (construction stage)

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the next section, **Section 15.3.4.1.**

The source-pathway-receptor links and the rationale for impacts excluded are described in the section directly after the Impact Evaluation Table, in Section 15.3.4.2.

Material Assets (Roads)

Topic

15.3.4.1 Impact Evaluation Table: Increased Journey Times

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Road works, construction traffic
Cumulative Impact Source: Road works, construction traffic
Impact Pathway: Roads

Impact Description: The presence of roadworks and increased traffic associated with construction vehicles could result in delays and disruption to road users along affected routes.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Increased Journey Times

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude: The Internal Windfarm Cabling requires 9 No. separate cable crossing of public roads, which will all be completed within one day.
Haul Route Works will take place at 13 No. locations and will be completed within 1 to 3 days at any location.
Flagmen will be used at these locations to minimise delays and disruption to local road users. Traffic management measures will be put in place on the approach to works, advance warning signage has been designed in accordance with the Traffic Signs Manual.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The lightly trafficked nature and extent of available capacity on all roads
- Brief to temporary (up to 3 days) duration of road works, with most trenching completed within one day at road crossing locations.
- The temporary duration of increased traffic associated with the delivery of construction materials;
- Application of traffic management measures and use of flagmen

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is no potential for in-combination travel delays due to road works from UWF Related Works and UWF Grid Connection, as works for these two elements on the L2264-50 and L6166-0 local roads will not be carried out at the same time.

The potential for cumulative effects relates to additional construction related traffic on local roads within the study area for deliveries to Upperchurch Windfarm and UWF Related Works construction works areas, there will also be increased traffic on the regional road for Upperchurch Windfarm, UWF Related Works and UWF Grid Connection deliveries.

Significance of the Impact: ranging from Imperceptible to Slight:
Slight significance for Road Users on the L2264-50, L6188-0, L4138-12 and the L4139-0 local roads in the Knockmaroe/Knockcurraghbola/Shevry areas, and **Imperceptible** for Road Users on other Public Roads

Rationale for Impact Evaluation:

- The lightly trafficked nature and extent of available capacity on all roads
- The temporary duration of increased traffic associated with the delivery of construction materials;

Application of traffic management measures and use of flagmen

Road Users

Sensitive Aspect

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

Element 1: UWF Grid Connection

Impact Magnitude: The UWF Grid Connection requires trenching along the public road L-2166-0 for 2.26km which will be completed within c.25 days, along the public road R503 for 23.1km which will be completed within c.250 days, along the public road L-2264-50 for 1.9km which will be completed within c.20 days, and along the public road L-6188-0 for 0.33km which will be completed within 11 days. Roadworks may be taking place at c.4 location on the R503 regional road.

Traffic counts were carried out in January 2019 at 3 locations on the R503, 2 locations on the L2166-0, 1 location on the L2264-50 and 1 location on the L6188-0. The L2166-0 counters recorded on average 1415 trips over a 24-hour period, the R503 counters recorded on average 1507 trips over a 24-hour period, the L2264-54 counters recorded on average 183 trips over a 24-hour period, L6188-0 recorded on average 76 trips over a 24-hour period.

During 110kV UGC trenching works, flagmen will be used at the works locations to minimise delays and disruption to local road users. Traffic management measures will be put in place on the approach to works, advance warning signage has been designed in accordance with the Traffic Signs Manual.

AAs per Appendix 15.1: Traffic and Transport Assessment Report, the additional construction traffic associated with the UWF Grid Connection will have a negligible effect on the network capacity and operation of the roads within the study area, with 95.2%, on average, of the capacity of the majority of the affected roads will remain available during the construction stage.

Significance of the Impact: Imperceptible to Slight

Rationale for Impact Evaluation:

- The lightly trafficked nature and extent of available capacity on all roads
- The temporary duration of increased traffic associated with the delivery of construction materials;
- Application of traffic management measures and use of flagmen

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 15.3.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: There are no works to the public road associated with the Upperchurch Windfarm.
As per Appendix 15.1: Traffic and Transport Assessment Report, the additional construction traffic associated with the Upperchurch Windfarm will have a negligible effect on the network capacity and operation of the roads within the study area, with 99.2%, on average, of the capacity of the majority of the affected roads will remain available during the construction stage.

Significance of the Impact: not be significant

Rationale for Impact Evaluation:

- As per the ABP Inspectors Report: I would therefore agree that the development will impact on the road network and cause disruption to road users but the overall impact will be confined to the time span of the construction period. Impacts can I consider be addressed and mitigated by the implementation of the construction management plan.
- As per the Grant of Permission 2014: it is considered that, subject to compliance with the conditions set out below, the development would not seriously injure the amenities of the area or of property in the vicinity, and would be acceptable in terms of traffic safety and convenience

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 15.3.2.2.1*

Material Assets (Roads)

Topic

Evaluation of Other Cumulative Impacts – Increased Journey Times
Whole UWF Project Effect
Cumulative Impact Magnitude: The Whole UWF Project works requires road works on 25. No. public roads within the study area with 2 locations overlapped between these elements – L2264-50 and L6188-0 (relating to 110kV UGC trenching and Internal Windfarm Cabling Trenching and Haul Route Works) for a period of c.30 days, otherwise the UWF Related Works and UWF Grid Connection works will be on separate public roads with very little overlap. The construction works will also cause an increase in traffic volumes on roads due to the construction traffic delivering construction materials, four roads will be subject to construction material haulage traffic from more than one element – the L2264-50, L6188-0, L4138-12 and L4139-0. These roads are very lightly trafficked, worst case construction traffic will cause an increase of less than 10% on the L4139-16 and the L2264-34, an average increase of 39% on the L2264-50, 6188-0, L4139-0, 4138-12 and L61881-0, and a doubling of traffic on the L6185-13 (from c.14 to c.39) vehicles per day. Notwithstanding the doubling the traffic volumes, over 99.5% of the capacity of the road will remain available on these roads. As per Appendix 15.1: Traffic and Transport Assessment Report, the cumulative additional construction traffic associated with the UWF Grid Connection, UWF Related Works and the Upperchurch Windfarm will have a negligible effect on the network capacity and operation of the roads within the study area, with 97.2%, on average, of the capacity of each of the majority of the affected roads will remain available during the construction stage.
Significance of the Cumulative Impact: ranging from Imperceptible to Slight: **Slight significance** for Road Users on the R503, L2264-50, L6188-0, L4138-12 and the L4139-0 local roads in the Knockmaroe/Knockcurraghbola/Shevry areas, and **Imperceptible** for Road Users on other Public Roads.
Rationale for Cumulative Impact Evaluation: • The lightly trafficked nature and extent of available capacity on all roads • Brief to temporary (up to 3 days) duration of UWF Related Works road works, with most trenching completed within one day at road crossing locations, and trenching along the length of a public road not lasting more than 3 days at any location, • The use and works on, mostly, separate public roads for the UWF Grid Connection and UWF Related Works, • The temporary duration of increased traffic associated with the delivery of construction materials; • Application of traffic management measures and use of flagmen

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Road Users with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 15.3.2.1).

15.3.4.2 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 15-16 below.

Table 15-16: Description and Rationale for Excluded Impacts to Road Users

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				
Traffic Management Road Works, Construction Traffic	1, 2	Road	Increased Risk of Road Accidents	Rationale for Excluding: No likely effect due to the lightly trafficked nature of the roads, the brief to temporary (between 1 day and c.250 days) of any road works, and the inclusion of the following road user protection measures in the project design (See Section 15.3.3) - the application of advanced signage and traffic management measures, which have been designed in accordance with the Traffic Signs Manual, on the approach to any works or site access points; the provision of sightlines at permanent site entrances; the use of flagman at temporary entrances, and the application of speed restrictions on vehicles delivering construction materials along the local road network, these project design measures will ensure the continued safe passage of all road users.
Traffic Management Road Works	1, 2, 4	Road	Interrupted or disrupted access to property	Rationale for Excluding: Neutral impact to road users: Roadworks will take place along 27.4km of public road network, however best practice measures will be put in place to ensure that there is no loss of access to properties along the 110kV UGC route. There will be no road closures and access will be provided at all times to 3rd party properties In relation to UWF Related Works, road works will be carried out at 18 No. locations, there will be no road closures and access will be provided at all times to 3rd party properties. There are no road works associated with Element 4 Upperchurch Windfarm.
Operational Stage				
Rationale for Excluding: Neutral Impacts or No Impacts: With regard to the UWF Grid Connection: The Mountphilips Substation, will be remotely monitored and secured, and will be inspected on a monthly basis. Each of the cable joint bays along the 110kV UGC and the ground above the 110kV UGC will be inspected annually. In total, it is expected that access to the joint bays/substation will occur over a total c.13 days per year, most likely using vans, will be associated with the routine operation of the UWF Grid Connection. Any infrequent maintenance (if at all) at Joint Bay locations may require roadworks very short periods of time (1 – 14 days). Impacts are expected to be Neutral given the very temporary duration and the implementation of traffic management measures during roadworks (if any) With regard to the UWF Related Works: The Telecoms Relay Pole and the ground above the Internal Windfarm Cables will have one inspection per year, the Realigned Windfarm Roads will be visually inspected on a monthly basis during windfarm site inspections. Each inspection will ordinarily be by way of a normal car or small works van. However, it may require the use of larger machinery and plant for brief durations (c.1 day) to maintain the Realigned Windfarm Roads periodically during the operational stage. At Haul Route Works locations, the roads boundaries may need to be adjusted temporarily at some stage in the future in order to accommodate the transport of turbine components to and from the windfarm. It is considered that this will occur very infrequently during the operational stage. It is intended that the hard-core surface, which was installed during the				

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
construction works, will be left in-situ under the reinstated verges and boundaries and can be uncovered in the event of requiring its reuse. The resulting duration of any works at Haul Route Works locations will be brief, reversible with reinstatement and are typical of commonly occurring road works on Irish roads, therefore any impacts to Road Users, such as increased journey times, will be Neutral. With regard to the Upperchurch Windfarm: 1-2 small vehicle movements (van or four-wheel drive) per day associated with the maintenance of the windfarm, and few if any larger vehicle movements. The only larger vehicles would be those associated with the windfarm are the replacement of turbine parts, which may be required infrequently during the operational stage. In any case the use of larger vehicles will involve very small numbers of larger vehicle movements, all of which will comply with axle loadings, and vehicle movements associated with large turbine components will take place outside of peak hours. Due to the very low traffic volumes associated with Upperchurch Windfarm, which are less than those associated with a residential dwelling and the absence of roadworks, the effects to Road Users will be Neutral.				
Decommissioning Stage				
Rationale for Excluding: Neutral Impacts/No Impacts. The UWF Grid Connection will not be decommissioned, therefore there is no potential for effects. The traffic volumes associated with those parts of the UWF Related Works which will be decommissioned (Telecoms Relay Pole, cables from the Internal Windfarm Cables) will result in minimal traffic condition changes which will not be noticeable on the local roads, and neutral effects to Road Users is expected. In relation to the Haul Route Works: It is not known at this time whether the turbine components will be broken up and transported off-site in smaller parts for recycling, or if some or all of the turbine components will be transported offsite for reuse. Should turbine components be transported offsite, then the road verges/boundaries at Haul Route Works locations will be widened once more, similar to infrequent widening during the operational stage, to facilitate the transport of turbine components (if needed). The duration of any works at Haul Route Works locations will be brief, reversible with reinstatement and are typical of commonly occurring road works on Irish roads, therefore any impacts to Road Users, such as increased journey times, will be Neutral. . In relation to the Upperchurch Windfarm, the traffic volumes associated with the decommissioning of the turbines will be low, and for the most part will consist of HGVs and vans transporting turbine parts off-site. Turbine component transportation off-site, if any, will be carried out during off-peak hours (typically during the early hours of the morning) when there are few, if any motorists on local and regional roads, it is considered that effects to Road Users, if any, will be neutral.				

15.3.5 Mitigation Measures for Impacts to Road Users

Mitigation measures were incorporated into the UWF Related Works project design, including the Project Design Measures, and it is this design that has been evaluated in this topic chapter. No additional mitigation measures are required as **no significant adverse impacts** are concluded by the topic authors as likely to occur to Road Users as a consequence of the UWF Related Works.

15.3.6 Evaluation of Residual Impacts to Road Users

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 Road Users above (Section 15.3.4) – i.e. **no significant adverse impacts**.

15.3.7 Application of Best Practice and the EMP for Road Users

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 **Public Roads,** by the authors of this topic chapter, using industry best practice:

RW-BPM-30	Traffic Management Measures

This Best Practice Measure is included in full at the end of this topic chapter, and also forms part of the Traffic Management Plan for the UWF Related Works.

The Traffic Management Plan (TMP) for the public roads will be a key construction contract document, the implementation of which will reduce possible impacts which may occur due to the presence of construction traffic and works on the public roads, in particular the Local Roads in the vicinity. It is a particular objective of this plan to control and minimise the traffic impacts of construction insofar as it may affect the local environment, local residents and the travelling public on the public roads close to and adjacent to the construction site, through measures to maximise the safety while keeping traffic flowing as freely as possible. The TMP will be updated from time to time to include any relevant planning conditions in addition to any new information on 3rd party road works or events, which would impact on the construction traffic route and timing. The appointed Contractor will be responsible for carrying out and managing the construction activities in accordance with the TMP.

The Traffic Management Plan forms part of the UWF Related Works Environmental Management Plan, which is included as Volume D with the planning application..

15.3.8 Summary of Impacts to Road Users

A summary of the Impact to Road Users is presented in Table 15-17.

Table 15-17: Summary of the impacts to Road Users

Impact to Road Users:	**Increased Journey Times**
Evaluation Impact Table	*Section 15.3.4.1*
Project Life-Cycle Stage	Construction
UWF Related Works *Direct or indirect impacts*	**Imperceptible**
UWF Related Works *Cumulative impacts*	**Ranges from Imperceptible to Slight**
Element 1: UWF Grid Connection	Imperceptible to Slight
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 15.3.2.2.1
Element 4: Upperchurch Windfarm	Not be Significant
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 15.3.2.2.1
Other Cumulative Impact:	
Whole UWF Project effect	**Ranges from Imperceptible to Slight**

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 were evaluated as having potential to cause cumulative effects to Road Users with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 15.3.2.1).

Road Users
Sensitive Aspect

Material Assets (Roads)
Topic

15.4 Policy Context

15.4.1 Regional Policy

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.

In Chapter 3: Developing a Vision for the Region; Section 3.1.4 North Tipperary, it is recognised that the cross-country transport corridors that link Nenagh with Birr, Thurles with Roscrea and Birr and *Thurles with Limerick City* are significant in the county. However, for the potential benefits of these transport corridors to be realised, substandard parts of the roads must be upgraded and the social and economic linkages between the towns along these corridors developed. The transport infrastructure with the county and the relationship of the County's towns with adjacent settlements in other regions is seen as an advantage in terms of development of FDIs and tourism.

In Chapter 6 Regional Priorities: Section 6.1.1; Transport and Infrastructure Strategy it is a regional priority to improve the road link between Thurles and Limerick City and it states that one of two routes through which this can be achieved is by upgrading the existing R503 Newport Road to provide a high-quality surface, commensurate with the traffic volumes it carries. This upgrade work is ongoing, with the Rear Cross section upgraded recently. These plans and the work already completed is one of the principle reasons that the Roads Engineer of Tipperary County Council was not in favour of an under – road grid connection route along the R503 and why the final route chosen for the underground UWF Grid Connection, has avoided the R503 completely.

15.4.2 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 North Tipperary until such time as a single County Development Plan is prepared for the County.

In *Chapter 9: Transport, Water Services & Environmental Management, Section 9.3,* neither the R503 nor the R497 are identified on a list of National and Regional Road Infrastructure Priorities*, but are* identified as Strategic Roads, by virtue of their significance in terms of connectivity between settlements and roles as scenic routes. Policy T13 which is relevant, states 'it is the policy of the Council to avoid the creation of any additional access points from new development or the generation of increased traffic from existing accesses to Strategic Routes…'. There are no new entrances or use of existing access points from the R503 or from the R497 required for the operation of the subject development. Both roads are lightly trafficked and can accommodate extra traffic during the construction stage of the subject development.

In Chapter 10: Section 10.9 outlines sightline requirements and Traffic and Transport Impact Assessment (TTIA) requirements. Sightlines at permanent site access points have been designed in accordance with the specifications listed in *Section 10.9.1.* The Local Road sightline recommendations cannot be achieved without extensive vegetation trimming and therefore, as agreed with Tipperary County Council, each construction crew will use a flagman system to control construction and other traffic safely at the entrances. This will mitigate the adverse effects on Biodiversity and Landscape of loss of vegetation and hedgerows. A Traffic and Transport Impact Assessment has been prepared, see **Appendix 15.1.**

Best Practice Measures

15.5 Best Practice Measures

RW-BPM-30	Traffic Management Measures
Environmental Commitment	
Manage traffic to ensure that construction traffic will travel safely and efficiently along the public road network.	
Responsibilities	
Project Manager	• Consult with Tipperary County Council • Consult with Gardaí • Contractor arrangements regarding speed limits, alert beacons, haulage routes etc. • Oversee the implementation of the Traffic Management Plan
Construction Manager	• Install information, direction and warning signage in advance of road works, site entrances and along haul routes • Implement the Traffic Management Plan
Environmental Clerk of Works	• Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures
Community Liaison Officer	• Act as point of contact with local community, • Keep the local community informed of construction and road works in their area
Traffic Management Measure	
Communication and Information	
• The Project Manager will keep in contact with Tipperary County Council Roads Section, with a view keeping the Roads Section informed of up to date activities and to avoid any conflicting concurrent works and/or diversions that the Local Authority may have planned at the time of construction; • Ahead of works in an area, the Community Liaison Officer will inform local residents of the construction and delivery schedule. Residents will also receive a leaflet with an overview of the traffic schedule and the contact information for both the Community Liaison Officer and the Environmental Clerk of Works so that householders and local farmers can make enquiries to levels of usage and provide information on local events or work/activities which may conflict with the construction/delivery schedules. • The Construction Manager will erect an information sign at the Site Compound No.1 site entrance. This sign will give an overview of the construction traffic timetable; the contact numbers for the Environmental Clerk of Works and the Community Liaison Officer, and will serve as an advance warning to expect construction traffic on the road. • Directional signage will be installed at specific locations along the haul routes. The haul routes for construction material deliveries to the UWF Related Works will have clear directional signage from the R503 to the temporary site entrances, and this signage will be relocated to indicate the location of the UWF Related Works as the works progresses.	

Topic: Material Assets (Roads)

- Advance warning signage will be erected on both approaches to temporary site entrance locations and road works locations. The placement of this signage will be based on the recorded 85th percentile traffic speeds, or the posted limit, whichever is the higher.

Measures for Delivery Personnel

- These Traffic Management Measures will be part of the induction to all haulage companies delivering to site.
- All machinery entering the site will have working rotating beacons and these beacons will be activated to indicate to other traffic of their intention to enter or exit the site.
- All companies delivering aggregate, concrete or other materials to works areas will be instructed to use the designated haul routes and will be informed of designated delivery hours for routine deliveries.
- A speed limit of 50km/hr on the Local Roads between the R503 and R497 and the site entrances will be implemented and communicated to the companies delivering materials to site.
- All material deliveries will have a maximum axle load of 12 tonnes per axle.

Measures for Site Personnel

- A speed limit of 50km/hr will be implemented and communicated to the personnel travelling on the Local Roads between the Site Compound No.1 and the temporary site entrances.
- There will be onsite parking for all construction personnel at the Site Compound No.1.
- There will be no parking of any vehicles on the public road.

Protection of the Public Road Network from Surface water run-off

- To ensure that surface water run-off does not flow onto the public road surface, a concealed drain will be provided parallel to the public road network at the Site Compound No.1.

Measures for Local Residents

- All construction works will be carried out during daylight hours **(Project Design Measure).**
- 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 safe and efficient manner **(Project Design Measure).**
- With the exception of Baurnadomeeny, local access will be facilitated to properties at all times during the construction works on the public road network. No entrances will be blocked and flagmen will used to organise through traffic in the event of the public carriageway being temporarily obstructed.
- Construction works in Knockmaroe and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Grid Connection or Upperchurch Windfarm **(Project Design Measure).**

Measures to minimize debris on road

- In order to minimize mud and debris deposited on roadway surfaces there will be a dry wheel wash facility positioned at the site entrance for the Site Compound No. 1 and will be used by trucks exiting the site.

Best Practice Measures

- In addition to this a road sweeper will operate at all site entrances, as required, for the duration of the construction of the UWF Related Works and in particular, during the importation of aggregates and concrete.
- The road sweeper will keep the roads at sites entrances clean and clear of mud and debris

Road Repair and Reinstatement

- Following the completion of construction works, all road boundaries at temporary site access points or at temporary road widening locations will be reinstated along the existing alignment.
- Following road works for cable trenching, road pavements will be reinstated in accordance with the Tii Guidelines on the Opening, Backfilling and Reinstatement of Openings in Public Roads,
- Where the cables trench crosses perpendicular to the road, full width surface overlay to a distance of 5m beyond either side of the trench will be carried out. Where the cables are aligned along the length of the road, full-width surface overlay will be carried out on any sections of road where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250.
- Along construction materials haulage routes, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken along the routes of concentrated construction traffic between the R503 and the site entrances on the local road network. Whilst it is not expected to occur, any damage to structures or road pavements will be repaired to at least as good a condition as pre-works, and on damaged sections of roads where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250, full-width surface overlay will be carried out.
- Any road repairs if required following the end of the construction stage will be by arrangement with Tipperary County Council.

References

- Department of Transport - Traffic Signs Manual: Chapter 8 - Temporary Traffic Measures and Signs for Roadworks of the Department of Transport, Tourism and Sport Traffic Signs Manual, November 2015
- Opening, Backfilling and Reinstatement of Openings in Public Roads (Transport Infrastructure Ireland, September 2015)

Topic: Material Assets (Roads)

15.6 Summary of the Material Assets (Roads) Chapter

UWF Related Works is located in the vicinity of the Upperchurch Windfarm, and involves both works on lands within the Upperchurch Windfarm site for the Internal Windfarm Cabling, Realigned Windfarm Roads and Telecoms Relay Pole, and works along the public road network for the Haul Route Works and to provide temporary access to the Internal Windfarm Cabling locations.

Sensitive Aspects evaluated in this topic chapter include Public Roads and Road Users.

The main volume of traffic associated with UWF Related Works will occur during its construction, negligible traffic volumes are associated with the operational or decommissioning stages.

Access to works locations will be through the consented windfarm entrances off the R503 Regional Road and then via local roads to the various site access points. All of these roads are lightly trafficked and not congested.

During the construction stage, in order to facilitate the construction of Internal Windfarm Cabling and the construction of Haul Route Works there will be a total of 14 temporary access points from the local road network. There will also be road works at a number of locations which will involve the widening of the road at 13 locations, and the excavation of a trench for Internal Windfarm Cabling at 9 road crossing locations.

All roads damaged by the UWF Related Works construction traffic and road works will be repaired, with full width surface dressing laid along weaker sections of the public road.

15.6.1 Summary of UWF Related Works Impacts

- Adverse impacts to Public Roads, as a consequence of the UWF Related Works, will be Imperceptible for both damage to road boundaries and damage to road pavements.
- Adverse impacts to Road Users, as a consequence of the UWF Related Works, relate to increased journey times, and due to the lightly trafficked nature of the roads in the area, along with the available capacity on the roads and the temporary nature of the construction stage, effects are expected to be Imperceptible.

15.6.2 Summary of UWF Related Works Cumulative Impacts

- Adverse cumulative impacts to Public Roads, as a consequence of the construction stage of UWF Related Works and Upperchurch Windfarm, will be Slight in relation to removal of roadside boundaries and will be Imperceptible for cumulative damage to road pavements.
- Adverse cumulative impacts to Road Users, as a consequence of additional construction related traffic on local roads for deliveries to Upperchurch Windfarm and UWF Related Works construction works areas and on the R503 for Upperchurch Windfarm, UWF Related Works and UWF Grid Connection deliveries. The cumulative impacts are expected to be Imperceptible to Slight.

15.6.3 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 (in particular the construction traffic relating to Upperchurch Windfarm and UWF Grid Connection).

- Cumulative impacts to Public Roads and Road Users, as a consequence of the UWF Related Works with the Other Elements of the Whole UWF Project, will range from cumulatively Imperceptible to Slight.

15.6.4 Summary of Cumulative Impacts with Other Projects or Activities

There is no potential for cumulative effects with Other Projects or Activities.

15.7 Reference List

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Department of Transport, Tourism and Sport. *Regional and Local Roads*. http://dx.doi.org/10.2305/IUCN.UK.2009.RLTS.T58734A11834246.en. Downloaded on 2nd October 2017.

North Tipperary Leader Partnership, Rural Transport Programme. http://www.ntlp.ie/programme/rural-transport-programme/. Downloaded 2nd October 2017.

Road Safety Authority, Online Map of Collisons in Ireland. http://www.rsa.ie/RSA/Road-Safety/Our-Research/Collision-Statistics/Ireland-Road-Collisions/. Downloaded 27th September 2017.

Ecopower Developments Ltd. (2013) Upperchurch Windfarm Environmental Impact Statement 13510003

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Reference List

Topic Material Assets (Roads)

UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 16: Cultural Heritage

Topic Chapter Authors:	KILKENNY ARCHAEOLOGY Archaeological Consultants
EIAR Coordinator:	ECOPOWER

January 2019

REFERENCE DOCUMENTS

Topic **Cultural Heritage**

Contents

List of Figures

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

List of Appendices

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

Glossary of Terms

Term	Definition
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.

List of Abbreviations

Abbreviation	Full Term
RMP	Record of Monuments & Places
NIAH	National Inventory of Architectural Heritage
RPS	Record of Protected Structures
PD	Ecopower Project Design Environmental Protection Measure developed by members of the EIAR Team

16 Environmental Factor: Cultural Heritage

16.1 Introduction to the Cultural Heritage Chapter

16.1.1 What is Cultural Heritage?

Cultural Heritage relates to sites of archaeological, historical or architectural significance within the receiving environment. The study of Cultural Heritage, including archaeology, is the study of past societies through the material remains left by those societies and the evidence of their environment. Cultural Heritage consists of such material remains (whether in the form of sites, monuments, historic structures, landscapes or artefacts in the sense of moveable objects) and environmental evidence. Cultural heritage can vary greatly in form and date. Sites may have no visible surface features; the surface features of an archaeological site may have decayed completely or been deliberately removed but archaeological deposits and features may survive beneath the surface. Such sites may sometimes be detected as crop-marks visible from the air or have their presence indicated by the occurrence of artefact scatters in ploughed land, but in other cases may remain invisible unless uncovered through ground disturbance.

The legal definition of a Monument is defined in section 2 of the National Monuments Act 1930 as any a) artificial structure or group of structures, b) any cave, stone or other natural product, that has been carved, sculpted or worked upon or appears to have been purposely arranged, c) any part of any prehistoric/ancient tomb, grave or burial deposit, ritual, industrial or habitation site, and d) any place comprising the remains or traces of any structure, erection, cave, stone or natural product of any tomb, grave, burial deposit or ritual, industrial or habitation sites situated on land or in the territorial waters of the state. This definition is very broad and overlaps with a number of the other categories of cultural heritage such as architecture.

Archaeological objects are defined in section 2 of the National Monuments Act 1930 as “any chattel whether in a manufactured or partly manufactured or unmanufactured state which by reason of the archaeological interest attaching thereto or of its association with any Irish historical event or person has a value substantially greater than its intrinsic (including artistic) value, and the said expression includes ancient human, animal or plant remains”. The Irish State has legal ownership of all archaeological objects as a result of the Irish Supreme Court judgement in relation to the Derrynaflan hoard which was applied retrospectively to all archaeological objects found after the enactment of the Irish Constitution in 1922. Section 2 of The National Monuments Amendment Act (1994) gave the judgement a statutory basis.

Architectural heritage is defined in the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 as “(a) structures and buildings together with their settings and attendant grounds, fixtures and fittings, (b) groups of such structures and buildings, and (c) sites”.

Landscape comprises the visible features of an area of land, including physical elements such as landforms, living elements of flora and fauna, abstract elements like lighting and weather conditions, but from a cultural heritage viewpoint it is the human elements and the built environment that are most significant.

16.1.2 Overview of Cultural Heritage in the Local Environment

The UWF Related Works is located in the Slievefelim – Silvermine Mountain uplands area.

The Slievefelim to Silvermine Mountains upland area is a region with a rich and diverse history of human settlement going back to prehistoric times. This extended period of occupation is reflected in the

archaeological record. The broader upland (c.100mOD and above) landscape has many known monuments, recorded on the Record of Monuments and Places. While the spread of these monuments date from the Neolithic through to post medieval and modern times, the upland region appears to have been most intensively settled in the late Neolithic, with populations dispersing to the lower slopes during later periods (Grogan 2005, 21). A detailed description of the archaeological and historical background and of the cultural heritage sites within the study area is provided in Appendix 16: Detailed Cultural Heritage Desktop and Fieldwork Survey Results, which contains subsections A16.1.1 -Archaeological and Historical Background, A16.1.2 - Cultural Heritage Sites within the Study Areas, A16.1.3 - Test Excavation Report (Knockcurraghbola Common) and A16.1.4 - Field Walking Description.

Within the total study area for the UWF Related Works, a total of 65 Cultural Heritage Sites were identified and described. These included 24 No. sites listed on the Record of Monuments and Places (RMP), and 41 other built heritage sites were identified and mapped (see the detailed Fieldwork mapping in Appendix 16.4). These 41 sites primarily consisted of wells, lime kilns, gravel pits and quarries etc. which are shown on the historic editions of the ordnance survey maps.

The location of the UWF Related Works is illustrated on OSI Mapping on Figure RW 16.1: Location of the UWF Related Works on Historical Mapping.

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

16.1.3 Sensitive Aspects of the Cultural Heritage 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	Recorded Legally Protected Sites	Section 16.2
Sensitive Aspect No. 2	Other Recorded Sites	Section 16.3
Sensitive Aspect No. 3	Previously Unrecorded Sites	Section 16.4
Sensitive Aspect No.4	Unrecorded Subsurface Sites	Section 16.5

Each of the above listed Sensitive Aspects are evaluated individually in Sections 16.2 to 16.5 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 16.2 to 16.5. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

16.1.4 Sensitive Aspects excluded from further evaluation

No Sensitive Aspects are excluded from this topic chapter.

16.1.5 Overview of the Subject Development

The UWF Related Works are the subject development, being the subject of this appeal to An Bord Pleanála. The main parts of the UWF Related Works are identified in Table 16-1 below.

Table 16-1: 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.

16.1.6 The Authors of the Cultural Heritage Chapter

This report was written by Barry Fitzgibbon (MA MIAI) and Cóilín O'Drisceoil (MA MIAI), and revised by Cóilín Ó Drisceoil (in 2019) of Kilkenny Archaeology. The report authors are members of the Instituate of the Archaeologists of Ireland, the professional body of archaeologists in Ireland and are also qualified as licence-eligible archaeologists under the criteria set out by the National Monuments Service and the National Museum of Ireland. Kilkenny Archaeology specializes in evaluating the impact of large-scale development on Cultural Heritage sites in the receiving environment.

16.1.7 Sources of Baseline Information

The information sources outlined in Table 16-2 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 16-2: Sources of Baseline Information for Cultural Heritage

Type	Source
Consultation	Feedback was received from • Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs – Developments Application Unit. See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.

Type	Source
Guidelines	• 'Framework and Principles for the Protection of the Archaeological Heritage' *issued by the Dept. of Arts, Heritage, Gaeltacht and the Islands (1999)* • National Monuments Acts 1930-1994 • Heritage Act 2000 • Planning and Development Act 2000, as amended • The Architectural Heritage and Historic Properties Act, 1999. • European Convention on the Protection of the Archaeological Heritage (*Valetta Convention*, ratified by Ireland 1997) • The European Convention on the Protection of the Architectural Heritage (*Granada Convention*, ratified by Ireland in 1997). • ICOMOS Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005 • The National Roads Authority's (NRA) Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (2005) • Architectural Heritage Protection Guidelines for Planning Authorities (DAHG 2011).
Desktop	• Record of Monuments and Places • Record of Protected Structures • National Inventory of Architectural Heritage • National Museum of Ireland Topographic Files • All editions of the historic Ordnance Survey Maps (including the first edition 1841 and the second edition 1898 1:10560 maps) • Other historic mapping, such as the Down Survey (1655) and the Griffith Valuation (1850). • Review of Aerial Photography Mapping *Maps* • First edition 1840 Ordnance Survey map sheet • Second edition 1900 Ordnance Survey map sheet • Griffith's Valuation maps and valuation report • Records of Monuments and Places (RMP) constraints maps *Aerial photographs* • 2000 Ordnance Survey orthophotography • 2005 Ordnance Survey orthophotography • Google Earth • Bing maps aerial photos • Chapter 17: Landscape 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 • An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 • An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040
Fieldwork	• Field survey, walking of the works areas • Test excavations within the zone of notification for recorded monuments **Site 83** - *Stone Row (17E173)*

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

16.1.7.1 Certainty and Sufficiency of Information Provided

The information used to compile this chapter is collated from reports and documents generated by local authorities and statutory agencies, including the National Monuments Service, the National Museum of Ireland and the NIAH with remit both in the geographical area of the development and in the relevant regulatory field. In all cases the most recent publications are relied on. All documentation used is referenced at the end of the chapter. The possibility also exists for previously unrecorded, subsurface archaeology in the vicinity of the development, and while the likelihood of such features can be discussed, it is impossible to evaluate the exact extent and nature of these potential sites with any degree of certainty.

16.1.8 Methodology for Evaluating Effects

The criteria used by Kilkenny Archaeology for this cultural heritage appraisal has been derived from the National Roads Authority's (NRA) Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (2005). These criteria are set out in Table 16-3 and 16-4.

Table 16-3: NRA Criteria for Determining the Quality of Cultural Heritage Impacts

Quality of Impacts	Description
Negative	A change that will detract from or permanently remove an archaeological monument from the landscape.
Neutral	A change that does not affect the archaeological heritage
Positive	A change that improves or enhances the setting of an archaeological monument

Table 16-4: NRA Criteria for Determining the Significance of Impacts on Cultural Heritage

Significance of Impacts	Description
Profound	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeological site is completely and irreversibly destroyed by a proposed development.
Significant	An impact which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about the archaeological feature/site.
Moderate	A moderate direct impact arises where a change to the site is proposed which though noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological feature can be incorporated into a modern-day development without damage and that all procedures used to facilitate this are reversible.
Slight	An impact which causes changes in the character of the environment which are not significant or profound and do not directly impact or affect an archaeological feature or monument.
Imperceptible	An impact capable of measurement but without noticeable consequences in terms of the nature or character of the archaeological feature or monument.

16.2 Sensitive Aspect No.1: Recorded Legally Protected Sites

This Section provides a description and evaluation of the Sensitive Aspect - Recorded Legally Protected Sites.

16.2.1 BASELINE CHARACTERISTICS of Recorded Legally Protected Sites

16.2.1.1 STUDY AREA for Recorded Legally Protected Sites

The study area for Recorded Legally Protected Sites in relation to the UWF Related Works is described in Table 16-5 and illustrated on Figure RW 16.2: Recorded Legally Protected Sites within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 16-5: UWF Related Works Study Area for Recorded Legally Protected Sites

Study Area for Recorded Legally Protected Sites	Justification for the Study Area Extents
Construction Stage Effects; footprint of the construction works area plus 500m radius surrounding the footprint of the construction works areas.	Groundworks, and their potential to directly impact any Cultural Heritage Site, are restricted to the immediate footprint of the development area. The wider study area was adopted in order to assure that the full extent of each identified Cultural Heritage Site, as well as any associated, or ancillary, features or structures, could be fully appraised. It is extremely unlikely that Cultural Heritage Sites beyond this area could be impacted.
Operational Stage Visual Impacts 2km zone around the location of the Telecoms Relay Pole	Because of the relatively low heights of the relay pole, any visibility of the structures beyond 2km would be barely perceptible to none. The remainder of the UWF Related Works will either be placed below ground or will comprise stone roads or temporary widening works on the local road network which are a common occurrence in the area and will not cause any visual impacts, and for this reason these parts are not included in the operational stage study area.

16.2.1.2 Baseline Context and Character of Recorded Legally Protected Sites in the UWF Related Works Study Area

The Silvermine Mountains comprise many rounded peaks, c.300-700m in elevation, with intervening valleys of sloping pasture and winding rivers and streams. The mountains extend over an area of c.22km WE by c.15km NS. The Hollyford Formation is the main geological unit of the area. It is a formed of greywacke, siltstone and grit. These support predominantly shallow well drained mineral soils on the hill slopes and well or poorly drained deeper soils in low-lying areas. There are three rivers in the study area; the Mulkear, the Clare and the Bilboa. Each of these rivers runs in a general north-south direction through the mountains before flowing west to join the Shannon to the west. A detailed description of the topography and landuse along the various construction works areas, recorded during field walking, is provided in Appendix 16: Detailed Cultural Heritage Desktop and Fieldwork Survey Results (Volume C4: EIAR Appendices).

The Slievefelim to Silvermine Mountains upland area is a region with a rich and diverse history of human settlement going back to prehistoric times. This extended period of occupation is reflected in the archaeological record. The broader upland (c.100mOD and above) landscape has at least 680 known monuments, recorded on the Record of Monuments and Places. While the spread of these monuments date from the Neolithic through to post medieval and modern times, the upland region appears to have been most intensively settled in the late Neolithic, with populations dispersing to the lower slopes during later periods (Grogan 2005, 21). A detailed description of the archaeological and historical background of the study area in the context of the Slievefelim to Silvermine Mountain uplands is provided in Appendix 16.1.

Within the combined[1] UWF Related Works Study Areas, there are a total of 24 No. archaeological sites recorded on the Record of Monuments and Places (RMP). The 24 sites can be broken down as follows: 5 Barrows, 1 Cist, 2 Enclosures, 1 Fulacht Fiadh, 1 Possible Field System, 1 Ringfort, 8 Megalithic Tombs, 3 Standing Stones, 1 Stone Row and 1 Stone Circle.

The UWF Related Works construction works area occurs within the zone of notification of one of these sites; *RL6 - Stone Row* (30m from a section of Internal Windfarm Cabling). Archaeological testing was carried out at this site; the test report is included in Appendix 16.1.

In relation to the Operational Stage, there are 7 No. sites which will have theoretical visibility of the Telecoms Relay Pole *RL5 - Wedge Tomb, RL6 - Stone Row, RL7 - Fulacht Fiadh, RL8 - Megalithic Tomb, RL20 - Ring Barrow, RL21 - Ring Barrow and RL22 - Cist.* See Figure RW 16.2.

The sites within the study areas are identified and described in Appendix 16.1.

16.2.1.3 Importance of Recorded Legally Protected Sites

Sites listed on the Record of Monuments and Places are protected under the National Monuments Acts 1930-2004, as amended. None of the sites identified are classed as National Monuments.

16.2.1.4 Sensitivity of Recorded Legally Protected Sites

Archaeological sites can be affected by any groundworks which would partially or wholly damage the site itself or features/objects associated with the site or which may damage any associated subsurface features or structures which are no longer visible.

Some archaeological sites or monuments were most likely purposefully constructed in specific locations, on specific alignments, to take advantage of views of the surrounding landscape, celestial events and other monuments. As such the views of and from these sites are an integral part of the monuments character and could be affected by the presence of new structures in the local area.

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

Increased legal protections offered to Recorded Protected Sites under the National Monuments Acts 1930-2004, as amended, has resulted in a reduction of potential damage to said sites through typical human activity in the region (e.g. forestry and farming). The sites which survive in the study area tend to be earthworks or stone structures and barring any unforeseen catastrophic natural processes, it might take thousands of years before any significant damage occurs through processes such as weathering or erosion.

16.2.1.6 Receiving Environment (the Baseline + Trends)

No trends have been identified over the course of this report which would lead to changes to the Recorded Legally Protected Sites and it is therefore assumed in this report that the baseline environment identified above will be the receiving environment.

[1] for construction stage and operational stage effects

16.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

16.2.2.1 Cumulative Evaluation Study Areas

16.2.2.1.1 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 Recorded Legally Protected Sites	Justification for the Study Area Extents
Cumulative construction effects: 1km corridor from UWF Related Works construction works areas Cumulative operational effects; 4km radius from Telecoms Relay Pole	The double distance enables the identification of those parts of Other Elements or Other Projects or Activities which could cause cumulative effects with UWF Related Works. UWF Related Works construction works or Telecoms Relay Pole, on their own, could not have a material cumulative effect on prevailing landscape character or visual amenity beyond 500m from construction works or 2km from the Telecom Relay Pole, on the basis that the proposed development will have become a negligible component of the broader scale landscape fabric. Cumulative impacts to Cultural Heritage Sites is limited to those sites which could potentially be affected by both the UWF Related Works and by Other Elements of the Whole UWF Project and/or Other Projects or Activities.

The study is illustrated on **Figure CE 16.2: Recorded Legally Protected Sites within the UWF Related Works Cumulative Evaluation Study Area** (Volume C3 EIAR Figures). The other projects which are located within this area are; Upperchurch Windfarm, UWF Replacement Forestry, UWF Grid Connection and UWF Other Activities, Foilnaman Mast, Cummermore Communications Pole, and Milestone Windfarm.

16.2.2.1 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 16.2.2.2.1 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 16-6 and illustrated on Figure WP 16.2: Recorded Legally Protected Sites within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

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Table 16-6: Whole Project Cumulative Evaluation Study Area for Recorded Legally Protected Sites

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection Element 2: UWF Related Works Element 3: UWF Replacement Forestry Element 4: Upperchurch Windfarm (UWF) Element 5: UWF Other Activities	Cumulative Construction Stage Impacts; footprint of the construction works area plus 500m radius surrounding the footprint of the construction works areas, Cumulative Operational Stage Visual Impacts: 4km zone around the location of the Telecoms Relay Pole and around Mountphilips Substation	Cumulative impacts to Cultural Heritage Sites is limited to those sites which could potentially be affected by both the UWF Related Works and by Other Elements of the Whole UWF Project. Because of the relatively low heights of the Telecoms Relay Pole and the Mountphilips Substation, any visibility of the structures beyond 2km would be barely perceptible to none. There is no potential for intervisibility between the Mountphilips Substation and the Telecoms Relay Pole or between the Mountphilips Substation and the Consented UWF Turbines due to the intervening distances between the structures. The potential for cumulative effects is limited to the Telecom Relay Pole with the Consented UWF Turbines, it is considered that the potential for cumulative visual impacts does not extend beyond 2km from the Telecom Relay Pole – beyond 2km cumulative visual impacts will be Neutral. Visual impact: Regarding the consented Upperchurch Windfarm, any cumulative visual impacts beyond the study area for the Telecom Relay Pole will only relate to the presence of cumulative turbines in views containing the Consented UWF Turbines, the cumulative impacts of which have previously been assessed as acceptable by ABP, and for this reason the study area does not extend beyond the 4km for the Telecom Relay Pole. The 2014 Inspectors Report and 2013 EIS for the Upperchurch Windfarm is included with Volume F: Reference Documents, with the planning application.

16.2.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Recorded Legally Protected 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 Recorded Legally Protected 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 A2.3.16).

The results of this scoping exercise are that: Milestone Windfarm, Foilnaman Mast, Cummermore Communications Pole have been scoped in for evaluation of cumulative effects to Recorded Legally Protected Sites.

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16.2.2.1.1 Potential for Impacts to Recorded Legally Protected 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 Recorded Legally Protected Sites. The results of this evaluation are included in Table 16-7.

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 16.2. The baseline character of the areas around these projects is described in Section 16.2.2.3.

Table 16-7: 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	Evaluated as excluded: No likely effect/Neutral effect due to: • There are no Recorded Legally Protected Sites on the UWF Replacement Forestry lands, or within 500m of the lands, • The planting works will involve the manual turning of sod, and due to the absence of Sites on the lands or within 500m of the lands, damage to Recorded Legally Protected Sites is not likely to occur, • As there are no Recorded Legally Protected Sites within 500m of the lands and due to the location of the UWF Replacement Forestry in a valley rather than the top of a hill, it is considered that the visual effect of the maturing wood will be Neutral.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral effect/No potential for effects due to: • No mechanical excavation of soils nor the erection of new structures is associated with the UWF Other Activities, therefore there is no potential for either physical or visual impacts on Recorded Legally Protected Sites.
Other Projects or Activities	
Milestone Windfarm Foilnaman Mast Cummermore Communications Pole	Yes, included for the evaluation of cumulative effects

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16.2.2.2 Cumulative Information: Baseline Characteristics – Context & Character

16.2.2.2.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

Within the combined[2] UWF Grid Connection Study Areas, there are a total of 49 No. archaeological sites recorded on the Record of Monuments and Places (RMP). The environment within which these monuments occur is largely rural in nature across a mix of open farmland and cultivated forestry. Further details on the Recorded Legally Protected Sites within the study area are included in Appendix 16.1.

The variety of site types, and periods from which they originate, are indicative of the rich history of human activity, both religious and secular, in the Study Area. The 49 sites can be broken down by project element as follows; 1 Bawn, 1 Castle – tower house, 1 Graveyard, 2 Ritual site – holy wells, 2 Children's burial ground, 2 Church, 1 Barrow - bowl-barrow, 1 Earthwork, 2 Font, 1 Bridge, 1 Water mill - unclassified, 5 Ringfort - rath, 1 Castle - unclassified, 1 House - indeterminate date, 1 Barrow - ring-barrow, 6 Redundant record, 4 Enclosure, 4 Ringfort - cashel, 2 Bullaun stone, 2 Fulacht fia, 1 Mine - copper, 3 Megalithic tomb - wedge tomb, 1 Pit-burial, 1 Mound, 1 Megalithic tomb - unclassified and 1 Stone row.

The UWF Grid Connection construction works areas occur within the zone of notification of four of these sites: GL16 – *Bridge* (110kV UGC route crosses over this structure), GL18 – *Ringfort – rath* (c.20m north of the 110kV UGC route), GL28 – *Enclosure* (c.45m west of the 110kV UGC route), GL34 – *Mine – copper* (c.43m south of the 110kV UGC route)..

In relation to the Operational Stage, there are 4 No. sites which will have theoretical visibility of the Mountphilips Substation; *GL6 - Ringfort, GL8 – Bawn and GL7 - Castle - Tower House,* and *GL13 - Bowl Barrow.* See Figure GC 16.2. Figure GC 16.2 is included in the UWF Grid Connection EIA Report (2018) in Volume F: Reference Documents

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons where the 110kV UGC is located in the public roads R503 at Knocknabansha, and then along the L2264-50 and the L6188-0 and along the forestry road to the Consented UWF Substation.

16.2.2.2.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 16.2.2.2.1

16.2.2.2.3 Element 4: Already Consented Upperchurch Windfarm

The sites within 500m of Upperchurch Windfarm are included in the description for the UWF Related Works above.

In relation to visual effects, the sites with theoretical visibility of the Telecoms Relay Pole will also have theoretical visibility of the Consented UWF Turbines.

Consideration of the Passage of Time: With the exception of the Milestone Windfarm, which is now operational and taken into account in the cumulative evaluation herein, there has been no material change in the landscape of Upperchurch Windfarm area and there have been no RMP or NIAH status assigned to any new cultural heritage sites in the area, therefore the descriptions in the 2013 and 2014 documents remain relevant to the cumulative evaluations in this Revised EIAR.

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[2] for construction stage and operational stage effects

16.2.2.2.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 16.2.2.2.1

16.2.2.2.5 Other Projects or Activities

Milestone Windfarm comprises 4 no. operating wind turbines which will be viewed alongside the Consented UWF Turbines and across the valley from the Telecom Relay Pole.

The existing Foilnaman Mast is located on the Knockmaroe hill, c.200m from where the Telecoms Relay Pole (UWF Related Works) will be located. The existing Cummermore Communications Pole is located nearly 4km to the southwest of the Telecom Relay Pole location.

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16.2.3 PROJECT DESIGN MEASURES for Recorded Legally Protected 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.

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 16-8 are relevant to the Environmental Factor, Cultural Heritage, and in particular to the sensitive aspect **Recorded Legally Protected Sites**.

Table 16-8: UWF Related Works Project Design Measures relevant to Recorded Legally Protected Sites

PD ID	Project Design Environmental Protection Measure (PD)
PD08	All initial groundworks will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works. Where excavations occur in areas of archaeological potential such as fording points and associated marsh lands and watercourses all excavated material will be spread out and metal detected (under licence to National Monuments Service) as part of the finds retrieval strategy.

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 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.

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16.2.4 EVALUATION OF IMPACTS to Recorded Legally Protected Sites

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) - Recorded Legally Protected Sites.

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

Table 16-9: 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)*
Visual Impact (operational stage)	*Complete or partial destruction (construction stage)*
	Decommissioning Effects

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the following section 16.2.4.1.

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table, in Section 16.2.4.2.

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16.2.4.1 Impact Evaluation Table: Visual Impact

Impact Description	
Project Life Cycle Stage:	Operational Stage

Impact Source: Above ground structures, features and works
Cumulative Impact Source: Above ground structures, features and works
Impact Pathway: Visibility

Impact Description: The close proximity of new above-ground structures to Recorded Legally Protected Sites, may cause visual impacts to these sites, reducing the quality of the visual amenity or character or setting of a monument or site.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Visual Impact

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
There are 7 No. sites which will have theoretical visibility of the Telecoms Relay Pole; *RL5(GL47) - Wedge Tomb, RL6(GL48) - Stone Row, RL7(GL49) - Fulacht Fiadh, RL8(GL46) - Megalithic Tomb, RL20- Ring Barrow, RL21 - Ring Barrow and RL22 - Cist.* While there is theoretical intervisibility between the Telecoms Relay Pole and the sites listed above, the character of the relay pole – being an up to 18m high wooden pole with communication equipment in the form of 2 pairs of small dishes - will mean any visual impact is negligible to non-existent, and the Pole will be similar in appearance to wooden telephone and wooden electricity poles which are common in the area.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the small scale of the Telecoms Relay Pole
- The distance to the sites, with the nearest being 1.53km
- In the context of other, more noticeable, structures in the vicinity which include telecommunication masts and wind turbines;

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effects with the nearby existing Foilnaman Mast, and with Consented UWF Turbines, Milestone Windfarm turbines which occur within 4km of the Telecoms Relay Pole. The potential for cumulative visual impacts is limited to those 7 No. sites which will have theoretical visibility of the Telecoms Relay Pole; *RL5(GL47) - Wedge Tomb, RL6(GL48) - Stone Row, RL7(GL49) - Fulacht Fiadh, RL8(GL46) - Megalithic Tomb, RL20- Ring Barrow, RL21 - Ring Barrow and RL22 – Cist.*

Any cumulative visual impacts of Telecoms Relay Pole with the existing Cummermore Communications Pole will be negligible due to the separation distance (nearly 4km) between the two structures and the small scale of both structures.

There is no potential for cumulative effects with Mountphilips Substation (UWF Grid Connection) as the Mountphilips Substation is located on the far side of the upland area and there will be no intervisibility of the two projects.

It is considered that together the Telecoms Relay Pole and Consented UWF Turbines and operating Milestone Windfarm turbines will not have a greater magnitude of impact than the cumulative impact of Consented UWF Turbines and Milestone Windfarm turbines, as the Telecoms Relay Pole will be barely noticeable in the context

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of the larger turbines in the area, and will be similar in appearance to wooden telephone and electricity poles which are common in the area.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- No inter-visibility between Mountphilips Substation and any Other Project or Activity;
- Separation distance and small scale of Cummermore Communications Pole.
- Small scale of the Telecom Relay Pole and of the existing mast at Foilnaman.
- The Board considered that, subject to compliance with the mitigation measures set out in the Environmental Impact Statement, the consented Upperchurch Windfarm would not have a significant effect on the environment, either on its own or cumulatively with other windfarms in the area (which included Milestone Windfarm).

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

Element 1: UWF Grid Connection

Impact Magnitude: Although 4 No. Recorded Legally Protected Sites are theoretically visible from the **Mountphilips Substation**, (*GL6 - Ringfort, GL8 – Bawn and GL7 - Castle - Tower House,* and *GL13 - Bowl Barrow)* the results of drone surveys, carried out by the authors of Chapter 17: Landscape, demonstrates that the surrounding vegetation combined with the low lying location of the substation will completely screen the new substation completely from view from all of these 4 No. sites.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- There will be no inter-visibility of Mountphilips Substation with these 4 No. sites

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 16.2.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: As per the EIS 2013, it was evaluated that 8 No. out of a total 101 No. Recorded Protected Sites within a 4km study area of the turbines, will have intervisibility with all 22 wind turbines

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The Board considered that, subject to compliance with the mitigation measures set out in the 2013 EIS, the development would not have a significant effect on the environment.
- The application of Condition No. 7 and Condition No.8 which protect visual amenity.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 16.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Milestone Windfarm

Impact Magnitude:
As per Grant of Permission for the Milestone Windfarm, the planning authorised deemed that the windfarm would not adversely impact on the visual amenities or the landscape character of the area.

Significance of the Impact: Not significant

Rationale for Impact Evaluation:

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- The Board considered that, subject to compliance with the mitigation measures set out in the Environmental Impact Statement, the development would not have a significant effect on the environment.
- The application of Conditions which protect visual amenity.

Other Project: Foilnaman Mast

Impact Magnitude: Based on the character of the existing mast and communication pole being c.20m in height and being viewed as part of the baseline environment, it is considered that the magnitude of any visual impact is negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the small scale of the communication structures
- in the context of other, more noticeable, structures in the vicinity which include telecommunication masts and wind turbines.

Other Project: Cummermore Communication Pole

Impact Magnitude: Based on the character of the existing mast and communication pole being c.20m in height and being viewed as part of the baseline environment, it is considered that the magnitude of any visual impact is negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the small scale of the communication structures
- in the context of other, more noticeable, structures in the vicinity which include telecommunication masts and wind turbines.

Evaluation of Other Cumulative Impacts – Visual Impact

Whole UWF Project Effect

Cumulative Impact Magnitude:
There is no potential for cumulative visual impacts between the UWF Grid Connection and either the UWF Related Works or the Upperchurch Windfarm, given the separation distance and absence of intervisibility between the Mountphilips Substation and the Telecoms Relay Pole and the Upperchurch Windfarm.

In relation to the UWF Related Works, of the 7 No. Recorded Legally Protected Sites which will have a theoretical visibility of the Telecoms Relay Pole, all of these sites will also have theoretical visibility of the above ground structures associated with the Upperchurch Windfarm. It is considered that together the Telecoms Relay Pole and the Upperchurch Windfarm will not have a greater magnitude of impact than the Upperchurch Windfarm on its own, as the Telecoms Relay Pole will be barely noticeable in the context of the larger turbines in the area, and will be similar in appearance to wooden telephone and electricity poles which are common in the area.

Significance of the Cumulative Impact: Not Significant

Rationale for Cumulative Impact Evaluation:

- The Mountphilips Substation will not be inter-visible with any other elements of the whole project.
- The barely noticeable character of the Telecoms Relay Pole
- The barely noticeable character of the Telecoms Relay Pole and the absence of inter-visibility with the **Mountphilips Substation**

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All Elements of the Whole UWF Project with Other Projects or Activities
Cumulative Impact Magnitude: There is no potential for cumulative visual effects of the UWF Grid Connection with Other Projects or Activities, as the Mountphilips Substation will not be inter-visible with the Milestone Windfarm or with Foilnaman Mast or Cummermore Communications Pole. Cumulative visual effects in relation to the UWF Related Works are limited the Telecom Relay Pole and the Upperchurch Windfarm with the Milestone Windfarm. It is considered that due to its small scale, that the addition of the Telecoms Relay Pole to the viewsheds from cultural heritage sites will not cause any additional visual effect to that already evaluated (and considered acceptable) for the Upperchurch Windfarm - which included a cumulative evaluation of the visual impact of the Upperchurch Windfarm together with the Milestone Windfarm. It is also considered that due to their small scale, any views of the Telecoms Relay Pole together with the other existing communication structures will be cumulatively neutral.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • No inter-visibility between Mountphilips Substation and any Other Project or Activity. • Small scale of the Telecom Relay Pole and of the existing communication structures at Foilnaman and Cummermore. • The Board considered that, subject to compliance with the mitigation measures set out in the Environmental Impact Statement, the consented Upperchurch Windfarm would not have a significant effect on the environment, either on its own or cumulatively with other windfarms in the area (which included Milestone Windfarm).

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16.2.4.2 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 16-10 below.

Table 16-10: Description and Rationale for Excluded Impacts to Recorded Legally Protected Sites

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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequence)	Rationale for Excluding (Scoping Out)
Construction Stage				
Ground-works	1, 2, 4	Mechanical or manual excavation of soil.	Complete or partial de-struction	Rationale for Excluding: **no likely impact/Neutral impact** In relation to the UWF Grid Connection: No Recorded Legally Protected Sites are likely to be affected by construction works due to the distance of these sites from the construction works areas, which are located outside the Zone of Notification for all sites, with the exception of 4 No. sites near UWF Grid Connection construction works areas - GL6 – *Bridge in Newport*, GL8 – *Ringfort (rath) in Derryleigh,* GL18 – *Enclosure in Scraggeen,* GL24 – *Mine (copper) in Lackamore.* However, the UWF Grid Connection in close proximity to these sites relates to the construction of the 110kV UGC in the regional public road network which will avoid impacts to GL8 – *Ringfort (rath) in Derryleigh,* GL18 – *Enclosure in Scraggeen,* GL24 – *Mine (copper) in Lackamore. At* GL6 – *Bridge in Newport, the 110kV UGC will be constructed within a concrete curb within the road pavement over the bridge, there will be no interaction with the columns or structures which are described for this RMP (all are underneath the new parts of the bridge).* In relation to UWF Related Works: No Recorded Legally Protected Sites are likely to be affected by construction works due to the distance of these sites from the construction works areas, which are located outside the Zone of Notification for all sites, with the exception of and 1 No. site near the UWF Related Works - *RL6 – Stone Row* in Knockcurraghbola Commons. Test excavations at this site encountered no features or objects of archaeological significance. In relation to the Upperchurch Windfarm, as per the EIS 2013 (Section 12.3.1), all Recorded Legally Protected Sites, are located away from works areas and will not be directly or indirectly impacted by the permitted development. Furthermore, damage to currently unknown subsurface archaeology associated with these sites is not likely to occur due to both the separation distance between known sites and works areas and as the design of the subject development (see Section 16.2.3) and Condition No. 20 of the Grant of Planning 2014 in relation to the Upperchurch Windfarm, includes for the archaeological monitoring of all ground works during the construction stage. This will allow for an onsite archaeologist, in consultation with the

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequence)	Rationale for Excluding (Scoping Out)
				National Monuments Service and the National Museum of Ireland, to monitor groundworks and stop works in the affected area in the event of any archaeological features or objects being uncovered during excavation works, and will ensure that any features or objects uncovered will be preserved by record and/or preserved in situ, in consultation and under licence to the National Monuments Service and the National Museum of Ireland. It should be noted that 5 No. archaeological sites recorded on the Record of Monuments and Places (RMP) are located within 500m of construction works area associated with the UWF Grid Connection and the UWF Related Works and the Upperchurch Windfarm; RL9 - Wedge Tomb, RL8 - Megalithic Tomb, RL5 - Wedge Tomb, RL6- Stone Row and RL7 - Fulacht Fia, with the exception of RL6 – evaluated for UWF Related Works above, none of these sites are in close proximity to works areas, and the monitoring of all groundworks will ensure that any features or objects being uncovered during excavation works, and will ensure that any features or objects uncovered will be preserved by record and/or preserved in situ, in consultation with the National Monuments Service and the National Museum of Ireland.
Decommissioning Stage				
Rationale for Excluding: No potential for impacts, there are no new ground works required for decommissioning.				

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16.2.5 Mitigation Measures for Impacts to Recorded Legally Protected Sites

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 Recorded Legally Protected Sites as a consequence of the UWF Related Works.

16.2.6 Evaluation of Residual Impacts to Recorded Legally Protected Sites

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Recorded Legally Protected Sites above (Section 16.2.4) – i.e. **no significant adverse impacts**.

16.2.7 Application of Best Practice and the EMP for Recorded Legally Protected Sites

No UWF Related Works Best Practice Measures have been developed specifically for Recorded Legally Protected Sites.

16.2.8 Summary of Impacts to Recorded Legally Protected Sites

A summary of the Impact to Recorded Legally Protected Sites is presented in Table 16-11.

Table 16-11: Summary of the impacts to Recorded Legally Protected Sites

Impact to Recorded Legally Protected Sites:	**Visual Impact**
Evaluation Impact Table	*Section 16.2.4.1*
Project Life-Cycle Stage	*Operational Stage*
UWF Related Works Impact *Direct or indirect impact*	**Imperceptible**
UWF Related Works Impact *Cumulative impact*	**Not Significant**
Element 1: UWF Grid Connection	No Impact
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 16.2.2.2.1
Element 4: Upperchurch Windfarm	Not Significant
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 16.2.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	**Not Signifcant**
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Milestone Windfarm Foilnaman Mast Cummermore Communications Pole	**Imperceptible**

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

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16.3 Sensitive Aspect No.2: Other Recorded Sites

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

16.3.1 UWF RELATED WORKS – EVALUATED AS EXCLUDED

16.3.1.1 Baseline Characteristics of Other Recorded Sites in relation to UWF Related Works

Other Recorded Sites relate to sites recorded on the National Inventory of Architectural Heritage. Unless the sites are Recorded Monuments or Protected Structures these sites are not currently afforded any legal protection but are an important part of Irish architectural heritage.

There are no Other Recorded Sites within, or close to (within 500m), the UWF Related Works.

16.3.1.2 Evaluation of UWF Related Works

UWF Related Works was evaluated for its potential to cause impacts to Other Recorded Sites.

It was evaluated by the topic authors that UWF Related Works has no potential to cause impacts to **Other Recorded Sites,** for the following reasons

- There are no Other Recorded Sites within 500m of the construction works areas associated with UWF Related Works, therefore construction works have no potential to cause physical effects such as partial or complete damage to this type of Cultural Heritage Site.
- There are no Other Recorded Sites within 2km of the Telecom Relay Pole, therefore this new structure has no potential to cause any visual impacts to any Other Recorded Site.

16.3.1.3 Cumulative Evaluation for the Other Elements *(grey background)*

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.

UWF Related Works has no potential to cause impacts to Other Recorded Sites by itself, and therefore cannot have a cumulative effect. However, 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 Section 16.3.2 to Section 16.3.4 and included in the summary table in Section 16.3.8 in order to show the totality of the project**.**

16.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

16.3.2.1 Cumulative Evaluation Study Area

16.3.2.1.1 UWF Related Works Cumulative Evaluation Study Area

As UWF Related Works has no potential for direct or indirect effects to Other Recorded Sites, it consequently has no potential to cause cumulative effects to Other Recorded Sites.

16.3.2.1.2 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.

UWF Related Works has no potential to cause impacts to Other Recorded Sites by itself, and therefore cannot have a cumulative effect. However, 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 Section 16.3.2 to Section 16.3.4 and included in the summary table in Section 16.3.8 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 16.3.2.2.1 below.

The study area for the evaluation of whole project cumulative effects is described in Table 16-12 and illustrated on Figure WP 16.3: Other Recorded Sites within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 16-12: Whole Project Cumulative Evaluation Study Area for Other Recorded Sites

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection Element 3: UWF Replacement Forestry Element 4: Upperchurch Windfarm (UWF) Element 5: UWF Other Activities	Construction Stage Effects; footprint of construction works areas or activity locations plus 500m radius. Operational Stage Visual Impacts 2km zone around the location of new structures	Cumulative impacts to Cultural Heritage Sites is limited to those sites which could potentially be affected by both the UWF Related Works and by Other Elements of the Whole UWF Project. Because of the relatively low heights of the Telecoms Relay Pole and the Mountphilips Substation, any visibility of the structures beyond 2km would be barely perceptible to none. There is no potential for intervisibility between the Mountphilips Substation and the Telecoms Relay Pole or between the Mountphilips Substation and the Consented UWF Turbines due to the intervening distances between the structures. The potential for cumulative effects is limited to the Telecom Relay Pole with the Consented UWF Turbines, it is considered that the potential for cumulative visual impacts greater than Neutral does not extend beyond 2km from the Telecom Relay Pole.

16.3.2.1 Scoping of Other Projects or Activities and Potential for Impacts

The evaluation of cumulative impacts to Other Recorded 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 Other Recorded 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 A2.3.16).

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 Other Recorded Sites.

16.3.2.1.1 Potential for Impacts to Other Recorded 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 Other Recorded Sites. The results of this evaluation are included in Table 16-13.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 16.3.

Table 16-13: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Elements 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 • There are no Other Recorded Sites within the lands or within 500m of the lands, therefore there is no potential for UWF Replacement Forestry to have either physical or visual effects to this type of Cultural Heritage Site.
Element 4: Upperchurch Windfarm (UWF)	Evaluated as excluded: No potential for effects due to • As per the 2013 EIS, three are no Other Recorded Sites located in close proximity to the consented Upperchurch Windfarm. • As per the EIS 2013 (Section 12.3.1), no cultural heritage sites, (including Other Recorded Sites), will be directly or indirectly impacted by the permitted development.
Element 5: UWF Other Activities	Evaluated as excluded: Neutral effect/No potential for effects due to: • No mechanical excavation of soils nor the erection of new structures is associated with the UWF Other Activities, therefore there is no potential for either physical or visual impacts to Other Recorded Sites.

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16.3.2.2 Cumulative Information: Baseline Characteristics – Context & Character

16.3.2.2.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

There are 22 No. Other Recorded sites within the construction stage UWF Grid Connection Study Area; 5 sites are identified on the National Inventory of Architectural Heritage, and comprise of GR2 - *Cragg House,* GR6 - *Oakhampton House,* GR14 - *Charter School,* GR15 - *Saint John's Church of Ireland Graveyard,* GR10 - *Church of the Most Holy Redeemer,* GR11 - *School,* GR12 - *Saint John's Church,* GR13 - *House, GR14 - Bridge,* GR15 - *J. Daly House,* GR16 - *Newport Courthouse,* GR17 - *Newport Bridewell,* GR18 - *Handball Alley,* GR19 - *Church of the Visitation,* GR20 - *Rear Cross National School,* GR21 - *Anglesea Bridge, GR22 – Derryleigh House, GR1 – Cragg Demesne, GR3 – Mountphilips Demesne, GR4 – Barna Demesne, GR6 – Oakhampton Demesne, GR7 – Fort Emil Demesne,* . The construction works area is routed through *GR3 - Mount Philips Demesne*. See Figure WP 16.3: Other Recorded Sites within the Whole Project Cumulative Evaluation Study Area.

In relation to the Operational Stage, there are a total of 8 No. Other Recorded sites located within 2km of the **Mountphilips Substation** which will have theoretical visibility of the substation - *GR1 – Cragg Demesne,* GR2 - *Cragg House, GR3 – Mountphilips Demesne, GR4 – Barna Demesne,* GR5 - *Oakhampton House, GR6 – Oakhampton Demesne, GR7 – Fort Emil Demesne and* GR8 - *Charter School.*

. See Figure WP 16.3**.**

The majority of sites on the NIAH date from the 18th and 19th century and form part an important part of the region's built heritage. *GR6 - House* forms part of Oakhampton Demesne. *GR2 – Cragg House* and *GR8 – Charter School* are isolated in rural settings.

The five demesnes listed on the NIAH Garden Survey are likely to have their origins in the "Age of Enlightenment" in the 17th and 18th century. Large portions of these demesnes have been subsumed into the modern agricultural landscape and many of their characteristic features are unrecognisable.

Specifically in relation to the Mount Philips Demesne, in whose area the construction works will take place, *GR3 - Mount Philips Demesne* is described on the survey as having virtually no recognisable features visible. During field walking it was noted that this site has been subsumed into the modern agricultural landscape common to western extent of the UWF Grid Connection study area.

A Further details on the Other Recorded Sites within the study area are included in Appendix 16: Detailed Cultural Heritage Desktop and Fieldwork Survey Results (Volume C4: EIAR Appendices)**.**

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons where the 110kV UGC is located in the public roads R503 at Knocknabansha, and then along the L2264-50 and the L6188-0 and along the forestry road to the Consented UWF Substation. There are no Other Recorded Sites in this overlap area.

16.3.2.2.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 16.3.2.2.1

16.3.2.2.3 Element 4: Already Consented Upperchurch Windfarm

Not applicable – Element evaluated as excluded. See Section 16.3.2.2.1

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16.3.2.2.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 16.3.2.2.1

16.3.2.2.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 16.3.2.1.

16.3.2.3 Cumulative Information Baseline Characteristics - Importance of Other Recorded Sites

While sites listed on the NIAH are currently not afforded any legal protection, they have been identified as being an important part of Irish architectural heritage. Sites on the NIAH may be afforded legal protection in the future.

16.3.2.4 Cumulative Information Baseline Characteristics - Sensitivity of Other Recorded Sites

Other Recorded Sites may be affected by any works which would partially or wholly remove any part of the structure. In addition, demesne landscapes often incorporated views of the surrounding landscape into their design. In instances where these landscapes might survive, the views may be affected by new structures, which may potentially visually impact these sites.

16.3.2.5 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)

There are 11 No. sites on the NIAH Building Survey (listed above), which are currently occupied or in use. As such they are well maintained and unlikely to suffer negative impact from natural processes. Changes to these structures may come by way of improvements carried out by the occupiers.

The five demesnes listed on the NIAH Garden Survey been subsumed into the modern agricultural landscape common to western extent of the development area. These have been subject to large scale intensive farming, with new farm yards, buildings and roads having been constructed. Many of the internal farm subdivisions, as shown on the historic editions of the Ordnance Survey, have been removed and landscaping features and woodland have been removed. It is probable that the NIAH Garden Survey sites identified will continue to be subsumed into the surrounding agricultural landscape and, as such, will get less and less recognisable.

16.3.2.6 Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)

Any trends identified above which would lead to changes to the Other Recorded Sites is likely to only occur over a long period of time and it is therefore assumed in this report that the baseline environment identified above will be the receiving environment.

16.3.3 Cumulative Information: PROJECT DESIGN MEASURES for Other Recorded Sites

Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project (in particular the UWF Grid Connection) 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 the UWF Grid Connection which can found in this EIA Report in Appendices 5.3 in Volume C4: EIAR Appendices**.**

16.3.4 Cumulative Information: EVALUATION OF IMPACTS to Other Recorded Sites

It is evaluated that **UWF Related Works has no potential to cause impacts to Other Recorded Sites**, see Section 16.3.1.

This Section evaluates the **likely cumulative effects of the Other Elements** of the Whole UWF Project and the evaluation is based on the residual effects of the Other Elements of the Whole UWF Project.

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) - Other Recorded Sites.

As a result of the exercise, no impacts were included – all impacts were excluded.

Table 16-14: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
No Impacts Included for Evaluation	*Complete or partial destruction (construction stage)*
	Visual Impact (operational stage)
	Decommissioning stage

The source-pathway-receptor links and the rationale for excluded impacts are described next in **Section 16.3.4.1**.

16.3.4.1 Cumulative Information: Description and Rationale for Excluding (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 16-15 below.

Table 16-15: Description and Rationale for Excluded Impacts to Other Recorded Sites
Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Ground-works	1	Mechanical or manual excavation of soil.	Complete or partial destruction	Rationale for Excluding: No potential for impacts/No likely impacts, In relation to the UWF Grid Connection, a total of 22 No. Other Recorded Sites were identified within the study area, 13 No. of these sites are located some distance outside the boundary of the construction works and there is no potential for impacts to occur. Works will be carried out within the area of 1 No. site, which is a designed landscape recorded on the NIAH Garden Survey - *GR3* - Mount Philips Demesne. In relation to this site; *GR3 - Mount Philips Demesne* is described on the survey as having virtually no recognisable features visible. During field walking it was noted that of this site has been subsumed into the modern agricultural landscape in the area. Therefore, it is considered that there is no potential for impacts to *GR3 - Mountphilips Demesne*. In relation to the remaining 15 no. sites, based on preliminary investigations, it is considered that UWF Grid Connection works in close proximity to these sites relates to the construction of the 110kV UGC in the regional public road network which will avoid impacts to the 13 buildings listed. *At the two bridges listed (GR14 – Bridge in Newport,) the 110kV UGC will be constructed within concrete curbs or the road pavement over the bridge, there will be no interaction with the columns or structures which are described for sites are protected. At GR21 – Bridge, Anglesey Bridge on the R503, some works may be required to the bridge parapets which are currently broken and cracked. This work will be carried out as per specifications drawn up by a suitably qualified conservation engineer and agreed with the Architectural Heritage Advisory Service of the Department of Culture, Heritage and the Gaeltacht.* Furthermore, damage to currently unknown subsurface archaeology associated with these 15 sites is not likely to occur due to both the separation distance between known sites and works areas and as the design of the UWF Grid Connection (see section 16.3.3), includes for the archaeological monitoring of all ground works during the construction stage. This will allow for an onsite

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to monitor groundworks and stop works in the affected area in the event of any archaeological features or objects being uncovered during excavation works, and will ensure that any features or objects uncovered will be preserved by recordand/or preserved in situ, in consultation with the National Monuments Service and the National Museum of Ireland.
Operational Stage				
Above-ground structures	1	Visibility	Visual Impact	Rationale for Excluding: No potential for impact In relation to the UWF Grid Connection, only the **Mountphilips Substation** (up to 8m in height, with associated lattice towers extending to 18m) has the potential to cause visual effects (see Section 16.2.4), 8 No. sites will have <u>theoretical</u> visibility of the Mountphilips Substation- *GR1 – Cragg Demesne,* GR2 - *Cragg House, GR3 – Mountphilips Demesne, GR4 – Barna Demesne,* GR5 - *Oakhampton House, GR6 – Oakhampton Demesne, GR7 – Fort Emil Demesne and* GR8 - *Charter School.* . Drone surveys by the authors of Ch.17 Landscape demonstrate that there will be no visibility of the Mountphilips Substation from 7 No. of these sites, and the remaining site; *GR3 – Mount Philips Demesne* has been completely subsumed into the modern agricultural landscape and above surface features no longer exist, therefore it cannot be affected by visual impacts.
Decommissioning Stage				
Rationale for Excluding: UWF Grid Connection will not be decommissioned.				

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16.3.5 Mitigation Measures for Impacts to Other Recorded Sites

Mitigation measures are not relevant as there is **no potential for UWF Related Works to cause impacts** to Other Recorded Sites.

16.3.6 Evaluation of Residual Impacts to Other Recorded 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 16.3.1), i.e. **no potential for impacts.**

16.3.7 Application of Best Practice and the EMP for Other Recorded Sites

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

16.3.8 Summary of Impacts to Other Recorded Sites

The topic authors conclude that there is no potential for UWF Related Works to cause impacts to Other Recorded Sites.

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 16-16: Summary of the impacts to Other Recorded Sites

Impact to Other Recorded Sites:	**No impact**
Evaluation Impact Table (for Other Elements only)	*Section 16.3.4.1*
Project Life-Cycle Stage (for Other Elements only)	*All*
UWF Related Works Impact *Direct, indirect, cumulative impact*	**No Potential for Impacts Evaluated as Excluded - see Section 16.3.1**
Element 1: UWF Grid Connection	No potential for Impacts/ No Likely Impacts
Element 3: UWF Replacement Forestry	No Potential for Impacts - Evaluated as Excluded, see Section 16.3.2.2.1
Element 4: Upperchurch Windfarm	No Potential for Impacts - Evaluated as Excluded, see Section 16.3.2.2.1
Element 5: UWF Other Activities	No Potential for Impacts - Evaluated as Excluded, see Section 16.3.2.2.1
Cumulative Impact:	
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 were evaluated as having potential to cause cumulative effects to Other Recorded Sites with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 16.3.2.1).

16.4 Sensitive Aspect No.3: Previously Unrecorded Sites

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

16.4.1 BASELINE CHARACTERISTICS of Previously Unrecorded Sites

16.4.1.1 STUDY AREA for Previously Unrecorded Sites

The study area for Previously Unrecorded Sites in relation to the UWF Related Works is described in Table 16-17 and illustrated on Figure RW 16.4: Previously Unrecorded Sites within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 16-17: UWF Related Works Study Area for Previously Unrecorded Sites

Study Area for Previously Unrecorded Sites	Justification for the Study Area Extents
Construction Stage Effects; footprint of the construction works area plus 500m radius surrounding the footprint of the construction works areas.	Groundworks, and their potential to directly impact any Cultural Heritage Site, are restricted to the immediate footprint of the development area. The wider study area was adopted in order to assure that the full extent of each identified Cultural Heritage Site, as well as any associated, or ancillary, features or structures, could be fully appraised. It is extremely unlikely that Cultural Heritage Sites beyond this area could be impacted.
Operational Stage Visual Impacts 2km zone around the location of the Telecoms Relay Pole	Because of the relatively low heights of the relay pole, any visibility of the structures beyond 2km would be barely perceptible to none. The remainder of the UWF Related Works will either be placed below ground or will comprise stone roads or temporary widening works on the local road network which are a common occurrence in the area and will not cause any visual impacts, and for this reason these parts are not included in the operational stage study area.

16.4.1.2 Baseline Context and Character of Previously Unrecorded Sites in the UWF Related Works Study Area

The majority of the Previously Unrecorded Sites with the Slievefelim to Silvermines upland area date from the post medieval or early modern periods and reflect a wide variety of human rural activity. Examples include infrastructural, religious, agricultural and domestic sites. The sites mainly comprised of Lime Kilns, Wells, Quarries and Townland Boundaries, many of which are no longer standing.

Cartographic analysis, aerial photography and a thorough field survey identified a total of 41 No. additional Previously Unrecorded Sites within the study area relating to the UWF Related Works.

While these were all mapped over the course of this report, only 1 No. Previously Unrecorded Sites (RU1, House), was deemed to have potential significance, was numbered, listed and described in detail in the complete table of sites, which can be found in Appendix 16.2: Cultural Heritage Sites within the Study Areas.

In relation to the Operational Stage, there are 19 No. sites which will have theoretical visibility of the Telecoms Relay Pole; 1 No. of these is a lime kiln, 4 No. are gravel pits/quarries, 16 No. are springs/wells, 19 No. are points where the Internal Windfarm Cabling crosses townland boundaries and 1 No. is a house (GU1).

The environment within which these monuments occur is largely rural in nature across a mix of open farmland and cultivated forestry. A detailed description of the topography and landuse along the various sections, recorded during field walking, is provided in Appendix 16.4.

16.4.1.3 Importance of Previously Unrecorded Sites

While none of these sites are subject to any legal protection, nor are they uncommon structures in the Irish landscape, they form an integral part of the cultural heritage landscape and Ireland's built heritage, and are indicative of the long history of human activity within the study area.

16.4.1.4 Sensitivity of Previously Unrecorded Sites

Previously Unrecorded Sites may be affected by any groundworks which would partially or wholly remove any part of the structure. Because the majority of Previously Unrecorded Sites were not designed with specific views in mind, nor were they incorporated into a wider landscape of cultural heritage sites, they are unlikely to be sensitive to negative visual impacts arising from the construction of above ground structures.

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

Previously unrecorded sites are not subject to any legal protections and as such many have fallen out of use and into ruin, been demolished or subsumed into the modern agricultural and forestry landscapes. During field work it was found that many of the sites identified from the historic editions of the Ordnance Survey are no longer extant. It is considered that the gradual degradation or destruction of Unrecorded Upstanding Cultural Heritage sites will continue.

16.4.1.6 Receiving Environment (the Baseline + Trends)

Any trends identified above which would lead to changes to the Previously Unrecorded Sites is likely to only occur over a long period of time and it is therefore assumed in this report that the baseline environment identified above will be the receiving environment.

16.4.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

16.4.2.1 Cumulative Evaluation Study Area

16.4.2.1.1 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 Previously Unrecorded Sites	Justification for the Study Area Extents
Cumulative construction effects: 1km corridor from UWF Related Works construction works areas Cumulative operational effects; 4km radius from Telecoms Relay Pole	The double distance enables the identification of those parts of Other Elements or Other Projects or Activities which could cause cumulative effects with UWF Related Works. UWF Related Works construction works or Telecoms Relay Pole, on their own, could not have a material cumulative effect on prevailing landscape character or visual amenity beyond 500m from construction works or 2km from the Telecom Relay Pole, on the basis that the proposed development will have become a negligible component of the broader scale landscape fabric. Cumulative impacts to Cultural Heritage Sites is limited to those sites which could potentially be affected by both the UWF Related Works and by Other Elements of the Whole UWF Project and/or Other Projects or Activities.

The study is illustrated on Figure CE 16.4: Previously Unrecorded Sites within the UWF Related Works Cumulative Evaluation Study Area (Volume C3 EIAR Figures). The other projects which are located within this area are; Upperchurch Windfarm, UWF Replacement Forestry, UWF Grid Connection and UWF Other Activities, Foilnaman Mast, Cummermore Communications Pole, and Milestone Windfarm.

16.4.2.1.2 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 16.4.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements which are described in Table 16-18 and illustrated on Figure WP 16.4: Previously Unrecorded Sites within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

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Table 16-18: Whole Project Cumulative Evaluation Study Area for Previously Unrecorded Sites

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection Element 2: UWF Related Works Element 3: UWF Replacement Forestry Element 4: Upperchurch Windfarm (UWF) Element 5: UWF Other Activities	Construction Stage Effects; footprint of construction works areas or activity locations plus 500m radius. Operational Stage Visual Impacts 2km zone around the location of new structures	Cumulative impacts to Cultural Heritage Sites is limited to those sites which could potentially be affected by both the UWF Related Works and by Other Elements of the Whole UWF Project. Because of the relatively low heights of the Telecoms Relay Pole and the Mountphilips Substation, any visibility of the structures beyond 2km would be barely perceptible to none. There is no potential for intervisibility between the Mountphilips Substation and the Telecoms Relay Pole or between the Mountphilips Substation and the Consented UWF Turbines due to the intervening distances between the structures. The potential for cumulative effects is limited to the Telecom Relay Pole with the Consented UWF Turbines, it is considered that the potential for cumulative visual impacts greater than Neutral does not extend beyond 2km from the Telecom Relay Pole.

16.4.2.2 Scoping of Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Previously Unrecorded 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 Previously Unrecorded 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 A2.3.16).

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 Previously Unrecorded Sites.

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16.4.2.2.1 Potential for Impacts to Previously Unrecorded 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 Previously Unrecorded Sites. The results of this evaluation are included in Table 16-19.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 16.4. The baseline character of the areas around these projects is described in Section 16.4.2.3.

Table 16-19: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Elements 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 due to • There is no potential for damage to the Foilnaman/Knockcurraghbola Commons townland boundary, as no works are required to this boundary. • No other Previously Unrecorded Sites were mapped on the UWF Replacement Forestry lands during field surveys or desktop review, therefore there is no potential for any physical damage to any other Previously Unrecorded Sites. • In relation to visual effects from the maturing woodland; there are 3 Previously Unrecorded Sites (2 wells and a quarry) which will have theoretical visibility of the new woodland, however as these sites lack archaeological, cultural or historical significance it is considered that the maturing wood will cause Neutral visual effects.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral effect/No potential for effects due to: • No mechanical excavation of soils nor the erection of new structures is associated with the UWF Other Activities, therefore there is no potential for either physical or visual impacts to Previously Unrecorded Sites.

16.4.2.3 Cumulative Information: Baseline Characteristics – Context & Character

It should be noted that 18 No. Previously Unrecorded Sites are located within the study area associated with both UWF Related Works and UWF Grid Connection and/or Upperchurch Windfarm; all of these fall within the category of well, or lime kiln or townland boundary.

16.4.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

Cartographic analysis, aerial photography and a thorough field survey identified a total of 165 No. additional Previously Unrecorded Sites within the study area relating to the UWF Grid Connection. While these were all mapped over the course of this report, only 44 No. Previously Unrecorded Sites were deemed to have potential significance, was number, listed and described in detail in the complete table of sites, which can be found Appendix 16.4: Field Walking Description.

Of the 44 No. Previously Unrecorded Sites, 20 No. Previously Unrecorded Sites were identified within 2km of Mountphilips Substation and 24 no. Previously Unrecorded Sites within 500m of the 110kV UGC route.

These comprise of GU1 -Pond, GU2 - House, GU3 - Ford, GU4 - Bridge, GU5- House, GU6 - Stepping Stones, GU7 - Demesne, GU8 House, GU9 - Lodge, GU10 - House, GU11 Lodge, GU12 Stepping Stones, GU13 - House, GU14 - Mill, Site GU15 - Bridge, Site GU16 - House, Site GU17 – School, Site GU18 - Demesne, Site GU19 - Demesne and GU20 - Smithy, GU21 - Well, GU22 - Lime Kiln, GU23 - Lime Kiln GU24 - Well, GU25 - Lime Kiln, GU26 - Lime Kiln, GU27 - Lime Kiln, GU28 - Shaft, GU29 – Lackamore Lodge, GU30 – Lackamore Post Office, GU31 - Ford, GU32 - Well, GU33 - Creamery, GU34 - Smithy, GU35 – Barracks, GU36 - Well, GU37 - Well ,

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GU38 - Well, GU39 - Lime Kiln, GU40 - Well, GU41 - Smithy, GU42 – Kilcommon Creamery, GU43 – Barracks, GU44 - Well. The 44 no. Previously Unrecorded Sites are included on Figure WP 16.4.

In relation to the Operational Stage, 12 no. of the 20.no sites identified above will have theoretical visibility of the **Mountphilips Substation**. GU1 -Pond, GU2 - House, GU5- House, GU7 - Demesne, GU8 House, GU9 - Lodge, GU10 - House, GU11- Lodge, Site GU16 - House, Site GU17 – School, Site GU18 - Demesne and GU20 – Smithy.

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons where the 110kV UGC is located in the public roads R503 at Knocknabansha, and then along the L2264-50 and the L6188-0 and along the forestry road to the Consented UWF Substation.

16.4.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 16.4.2.2.1

16.4.2.3.3 Element 4: Already Consented Upperchurch Windfarm

The 41 No. Previously Unrecorded Sites, identified for the UWF Related Works are also relevant to the Upperchurch Windfarm construction works areas and the Consented UWF Turbines.

Consideration of the Passage of Time: With the exception of the Milestone Windfarm, which is now operational and taken into account in the cumulative evaluation herein, there has been no material change in the landscape of Upperchurch Windfarm area and there have been no new cultural heritage sites have been since identified in the windfarm site, therefore the descriptions in the 2013 and 2014 documents remain relevant to the cumulative evaluations in this Revised EIAR

16.4.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 16.4.2.2.1

16.4.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 16.4.2.1.

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16.4.3 PROJECT DESIGN MEASURES for Previously Unrecorded 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.

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 16-20 are relevant to the Environmental Factor, Cultural Heritage, and in particular to the sensitive aspect **Previously Unrecorded Sites**.

Table 16-20: UWF Related Works Project Design Measures relevant to Previously Unrecorded Sites

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.
PD08	All initial groundworks will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works. Where excavations occur in areas of archaeological potential such as fording points and associated marsh lands and watercourses all excavated material will be spread out and metal detected (under licence to National Monuments Service) as part of the finds retrieval strategy.

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 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.

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16.4.4 EVALUATION OF IMPACTS to Previously Unrecorded Sites

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) - Previously Unrecorded Sites.

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

Table 16-21: 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)*
Damage to townland boundaries (construction stage)	*Complete or partial destruction on other Previously Unrecorded Sites (i.e. not townlands) (construction stage)*
	Visual Impact (operational stage)
	Decommissioning Effects

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the next section – Section 16.4.4.1.

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table, in Section 16.4.4.2.

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16.4.4.1 Impact Evaluation Table: Damage to townland boundaries

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Initial groundworks during the construction phase
Cumulative Impact Source: Initial groundworks during the construction phase
Impact Pathway: Excavation or removal of townland boundaries

Impact Description: Likely impacts to Previously Unrecorded Sites are limited to the mechanical or manual excavation of and temporary or permanent removal of small sections of townland boundaries at both site access points and to install cables or roads along works areas. Often modern townland boundaries have origins going back to the medieval period or earlier, where they might have acted as extents for manors or ancient landholdings. As such, any associated structures or ditches may contain archaeologically significant material which may be damaged or removed during ground works.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Damage to Townland Boundaries

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
The construction of the UWF Related Works will involve the temporary removal of c.55m of boundary at 12 No. of townland boundaries and the permanent removal of c.15m at 3 No. townlands boundaries along the route of the Internal Windfarm Cabling, Haul Route Works and Realigned Windfarm Road locations.
3 no. of these points are through existing farm/forestry gates or farm/forestry roads, and 12 no. are new boundary crossing points.

During field investigations, nothing of archaeological significance was found at any of these locations.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- Only a very small portion (up to 10m) of the total extent of any particular townland boundary is to be affected by the UWF Related Works.
- Over the course of the field inspection there was no indication of any obvious features of archaeological significance associated with the affected townland boundaries.
- The townland boundaries in the region have been subject to continuous alterations, demolition and removal as a result of development, agriculture and forestry in recent times.
- The design of the development (see section 16.4.3) includes a provision for archaeological monitoring of all ground works relating to the construction. This will allow for an onsite archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to archaeologically record and preserve, either *in situ* or *by record*, any structures, features or objects of archaeological significance which may be encountered during the works.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effects of UWF Related Works with Upperchurch Windfarm within the cumulative study area. UWF Related Works will involve the temporary removal of c.55m of boundary at 12 No. of townland boundaries and the permanent removal of c.15m at 3 No. townlands boundaries. Upperchurch Windfarm will involve the permanent removal of c.60m at 7 No. townlands boundaries and 4 no. are new boundary crossing points. However the footprint of these works for UWF Related Works and Upperchurch Windfarm do not overlap.

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

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Given the very small portion of the total extent of any particular townland boundary is to be affected, no indication of any obvious features of archaeological significance and that the UWF Related Works and Upperchurch Windfarm do not affect the same boundaries, the magnitude of impact is considered to be no greater than the UWF Related Works alone.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- Only a very small portion of the total extent of any particular townland boundary is to be affected by the UWF Related Works.
- Over the course of the field inspection there was no indication of any obvious features of archaeological significance associated with the affected townland boundaries.
- The townland boundaries in the region have been subject to continuous alterations, demolition and removal as a result of development, agriculture and forestry in recent times.
- The design of the development (see section 16.4.3) includes a provision for archaeological monitoring of all ground works relating to the construction. This will allow for an onsite archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to archaeologically record and preserve, either *in situ* or *by record*, any structures, features or objects of archaeological significance which may be encountered during the works.

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

Element 1: UWF Grid Connection

Impact Magnitude:
The construction of the UWF Grid Connection will involve the temporary removal of 1 No. townland boundary along the route of the 110kV UGC on the Coole/Freagh townland boundary, at this location a 180m section will be temporarily removed to provide sightlines at the public road site entrance.

2 No. townland boundaries (Mountphilips/Coole) will be affected by the permanent removal of short section of the boundary. On the Mountphilips/Coole townland boundary a 10m section will be permanently removed to facilitate the construction of the new access road to the Mountphilips Substation and on the Coole/Freagh townland boundary, a 5m section will be permanently removed to widen the existing site entrance at the public road site entrance.

During field investigations, nothing of archaeological significance was found at any of these locations.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- Only a very small portion (c.5 to 10m) of the total extent of any particular townland boundary is to be affected by the UWF Grid Connection.
- Over the course of the field inspection there was no indication of any obvious features of archaeological significance associated with the affected townland boundaries.
- The townland boundaries in the region have been subject to continuous alterations, demolition and removal as a result of development, agriculture and forestry in recent times.
- The design of the development (see section 16.4.3) includes a provision for archaeological monitoring of all ground works relating to the construction. This will allow for an onsite archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to archaeologically record and preserve, either *in situ* or *by record*, any structures, features or objects of archaeological significance which may be encountered during the works.

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Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 16.4.2.1.1*

Element 4: Consented Upperchurch Windfarm
Impact Magnitude: In total there will involve the permanent removal of c.60m at 7 No. townlands boundaries along the Upperchurch Windfarm roads. 3 no. of these points are through existing farm/forestry gates or farm/forestry roads. And 4 no. are new boundary crossing points
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The Board considered that, subject to compliance with the mitigation measures set out in the Environmental Impact Statement, the development would not have a significant effect on the environment. • The application of Condition No. 20 which will protect unknown subsurface archaeology.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 16.4.2.1.1*
Evaluation of Other Cumulative Impacts – Damage to Townland Boundaries
Whole UWF Project Effect
Cumulative Impact Magnitude: A total of 235m of boundary will be temporary removed at 13 No. townland boundaries and 80m of boundary will be permanently removed at 10 No. of townland boundaries (10m of which overlap at 2 No. boundaries between the Upperchurch Windfarm and the UWF Related Works) to accommodate the construction of the Whole UWF Project. None of these boundaries are of archaeological significance.
Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • Only a very small portion of the total extent of any particular townland boundary is to be affected by construction works. • Over the course of the field inspection there was no indication of any obvious features of archaeological significance associated with the affected townland boundaries. • The townland boundaries in the region have been subject to continuous alterations, demolition and removal as a result of development, agriculture and forestry in recent times. • The design of the development (see section 16.4.3) includes a provision for archaeological monitoring of all ground works relating to the construction. This will allow for an onsite archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to archaeologically record and preserve, either *in situ* or *by record*, any structures, features or objects of archaeological significance which may be encountered during the works.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Previously Unrecorded Sites with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 16.4.2.1).

16.4.4.2 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 16-22 below.

Table 16-22: Description and Rationale for Excluded Impacts to Previously Unrecorded Sites

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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Ground-works	1, 2, 4	Mechanical or manual excavation	Complete or partial destruction of other Previously Unrecorded Sites (i.e. not townland boundaries)	Rationale for Excluding: Damage to Previously Unrecorded Sites which are not townland boundaries are not likely to occur. Project Design Measures for UWF Grid Connection and UWF Related Works, and Condition No. 20 of the Grant of Planning 2014 in relation to the Upperchurch Windfarm, includes for the archaeological monitoring of all ground works during the construction stage. This will allow for an onsite archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to monitor groundworks and stop works in the affected area in the event of any archaeological features or objects being uncovered during excavation works, and will ensure that any features or objects uncovered will be preserved by record and/or preserved in situ, in consultation with the National Monuments Service and the National Museum of Ireland.
Operational Stage				
Above-ground structures	1, 2, 4	Visibility	Visual Impact	Rationale for Excluding: In relation to the UWF Grid Connection, only the Mountphilips Substation has the potential to cause visual effects and as per Section 16.2.4, within 2km there are 12 No. sites which would have theoretical visibility of the Substation, however, drone surveys by the authors of Ch.17 Landscape demonstrate that there will be no visibility of the Substation from any of these sites. In relation to the UWF Related Works - only the Telecoms Relay Pole has the potential to cause visual effects and 19 No. Previously Unrecorded Sites have theoretical visibility of the relay pole, however, the 19 No. sites (comprise of 6 No. wells and a small portion of 13 No. townland boundaries) lack archaeological, cultural or historical significance and it is considered that they are not sensitive to visual effects.
Decommissioning Stage				
Rationale for Excluding: No potential for impacts, there are no new ground works required for decommissioning.				

16.4.5 Mitigation Measures for Impacts to Previously Unrecorded Sites

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 Previously Unrecorded Sites as a consequence of the UWF Related Works.

16.4.6 Evaluation of Residual Impacts to Previously Unrecorded Sites

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Previously Unrecorded Sites above (Section 16.4.4) – i.e. **no significant adverse impacts**.

16.4.7 Application of Best Practice and the EMP for Previously Unrecorded Sites

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

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16.4.8 Summary of Impacts to Previously Unrecorded Sites

A summary of the Impact to Previously Unrecorded Sites is presented in Table 16-23.

Table 16-23: Summary of the impacts to Previously Unrecorded Sites

Impact to Previously Unrecorded Sites:	**Damage to townland boundaries**
Evaluation Impact Table	*Section 16.4.4.1*
Project Life-Cycle Stage	*Construction Stage*
UWF Related Works Impact *Direct or indirect impacts*	**Slight**
UWF Related Works *Cumulative impact*	**Slight**
Element 1: UWF Grid Connection	Slight
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 16.4.2.2.1
Element 4: Upperchurch Windfarm	Not Significant
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 16.4.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	**Slight**

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 were evaluated as having potential to cause cumulative effects to Previously Unrecorded Sites with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 16.4.2.1).

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16.5 Sensitive Aspect No.4: Unrecorded Subsurface Sites

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

16.5.1 BASELINE CHARACTERISTICS of Unrecorded Subsurface Sites

16.5.1.1 STUDY AREA for Unrecorded Subsurface Sites

The study area for Unrecorded Subsurface Sites in relation to the UWF Related Works is described in Table 16-24 and illustrated on Figure RW 16.5: Unrecorded Subsurface Sites within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 16-24: UWF Related Works Study Area for Unrecorded Subsurface Sites

Study Area for Unrecorded Subsurface Sites	Justification for the Study Area Extents
Footprint of construction works areas where groundworks will take place.	Any previously Unrecorded Subsurface Sites beyond this area will remain unexposed and there cannot be evaluated.

16.5.1.2 Baseline Context and Character of Unrecorded Subsurface Sites in the UWF Related Works Study Area

As this type of sensitive cultural heritage receptor is currently undiscovered, neither the context nor the character of any Unrecorded Subsurface Sites, which may potentially exist under the ground surface, can be described in this report. The Slievefelim to Silvermine Mountains upland area is a region with a rich and diverse history of human settlement going back to prehistoric times, with c.680 known monuments, recorded on the Record of Monuments and Places within the broader upland area. While the spread of these monuments date from the Neolithic through to post medieval and modern times, the upland region appears to have been most intensively settled in the late Neolithic, with populations dispersing to the lower slopes during later periods (Grogan 2005, 21).

Because much of the study area has been subject to intensive agriculture and later forestry planting, it is considered that Unrecorded Subsurface Sites exposed during the course of construction ground works are most likely to involve levelled earthworks, back filled ditches or slot trenches cut directly into the natural subsoil, or areas of large scale burning such as you might find at a Fulacht Fiadh site. There is also the possibility for many other site types being exposed, including (but not limited to) artefact scatters, objects such as pottery, stone and bronze axes, foundations of buried structures, burials, and trackways. A detailed description of the archaeological and historical background of the study area in the context of the Slievefelim to Silvermine Mountain uplands is provided in Appendix 16: Detailed Cultural Heritage Desktop and Fieldwork Survey Results (Volume C4 EIAR Appendices).

Because of the increased likelihood of Unrecorded Subsurface Sites in the vicinity of known archaeological monuments, archaeological test excavations were carried out at 1 No. location along the UWF Related Works construction works areas where construction works will pass within the Zone of Notification for RL6 – *Stone Row (17E173)* in Knockcurraghbola Commons. Nothing of archaeological significance was encountered during these test excavations. The test excavation reports are included in in Appendix 16.1.

16.5.1.3 Importance of Unrecorded Subsurface Sites

Subsurface features or structures of archaeological significance are subject to protection under the National Monuments Acts (1934-2014).

16.5.1.4 Sensitivity of Unrecorded Subsurface Sites

Unrecorded Subsurface Sites may be completely or partially damaged or destroyed by the manual or mechanical excavation of soil. Because of the lack of upstanding, or above ground, remains these sites are unlikely to be sensitive to any visual impacts with proposed above ground structures.

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

It is considered that while it is unlikely that there would be any change to the Unrecorded Subsurface Cultural Heritage sites within the application site, the possibility exists that Unrecorded Subsurface Sites may be uncovered by further agricultural activity or afforestation in the area.

16.5.1.6 Receiving Environment (the Baseline + Trends)

No trends have been identified which would lead to changes to the Previously Unrecorded Sites and it is therefore assumed in this report that the baseline environment identified above will be the receiving environment.

16.5.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

16.5.2.1 Cumulative Evaluation Study Areas

16.5.2.1.1 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 Unrecorded Subsurface Sites	Justification for the Study Area Extents
Footprint of UWF Related Works where groundworks will take place.	Groundworks, and their potential to directly impact Unrecorded Subsurface Sites, are restricted to the immediate footprint of the UWF Related Works development area. It is extremely unlikely that Sites beyond this area could be impacted.

The study is illustrated on **Figure CE 16.5: Unrecorded Subsurface Sites within the UWF Related Works Cumulative Evaluation Study Area** (Volume C3 EIAR Figures). The other projects which are located within this area are; Upperchurch Windfarm, UWF Replacement Forestry, UWF Grid Connection and UWF Other Activities, Foilnaman Mast, Cummermore Communications Pole, and Milestone Windfarm.

16.5.2.1.2 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 16.5.2.2.1 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 16-25 and illustrated on Figure WP 16.5: Unrecorded Subsurface Sites within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 16-25: Whole Project Cumulative Evaluation Study Area for Unrecorded Subsurface Sites

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Footprint of works areas where groundworks will take place.	Groundworks, and their potential to directly impact Unrecorded Subsurface Sites, are restricted to the immediate footprint of the development area. It is extremely unlikely that Sites beyond this area could be impacted.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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

The evaluation of cumulative impacts to Unrecorded Subsurface 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 Unrecorded Subsurface 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 A2.3.16).

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 Unrecorded Subsurface Sites.

16.5.2.1.1 Potential for Impacts to Unrecorded Subsurface 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 Unrecorded Subsurface Sites. The results of this evaluation are included in Table 16-26.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 16.5. The baseline character of the areas around these projects is described in Section 16.5.2.3

Table 16-26: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Elements 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 likely effect due to: • The UWF Replacement Forestry will comprise the planting by hand of 6ha of agricultural lands to native woodland. Ground works during planting will involve minor, manual turning of the sod which are unlikely to expose any subsurface structures, features or objects of archaeological significance, therefore there is little likelihood of damage occurring to any Unrecorded Subsurface Sites. • In relation to visual effects from the maturing woodland; it is unlikely that a monument will be uncovered during planting works, rather that Unrecorded Subsurface Sites (if any) will are likely to be small artefacts, levelled earthworks or backfilled cuts. These types of archaeology are considered unlikely to be sensitive to visual effects.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects due to: • No mechanical excavation of soils nor the erection of new structures is associated with the UWF Other Activities, therefore there is no potential for either physical or visual impacts to Unrecorded Subsurface Sites.

16.5.2.2 Cumulative Information: Baseline Characteristics – Context & Character

16.5.2.2.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

There is increased likelihood of Unrecorded Subsurface Sites in the vicinity of known archaeological monuments at 4 No. locations along the UWF Grid Connection construction works areas, where the construction works area passes through the Zone of Notification for GL6 – *Bridge in Newport*, GL8 – *Ringfort (rath) in Derryleigh,* GL18 – *Enclosure in Scraggeen and* GL24 – *Mine (copper) in Lackamore*

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area at two locations where the route of the 110kV UGC crosses the route of the Internal Windfarm Cabling, and along the local roads (L2264-50 and L6188-0) where 110kV UGC is located alongside Haul Route Works.

16.5.2.2.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 16.5.2.2.1

16.5.2.2.3 Element 4: Already Consented Upperchurch Windfarm

The consented Upperchurch Windfarm is not located within close proximity to any known archaeological monuments.

Consideration of the Passage of Time: is not relevant to Unrecorded Subsurface Sites.

16.5.2.2.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 16.5.2.2.1

16.5.2.2.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 16.5.2.1.

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16.5.3 PROJECT DESIGN MEASURES for Unrecorded Subsurface 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.

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 16-27 are relevant to the Environmental Factor, Cultural Heritage, and in particular to the sensitive aspect **Unrecorded Subsurface Sites**.

Table 16-27: UWF Related Works Project Design Measures relevant to Unrecorded Subsurface Sites

PD ID	Project Design Environmental Protection Measure (PD)
PD08	All initial groundworks will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works. Where excavations occur in areas of archaeological potential such as fording points and associated marsh lands and watercourses all excavated material will be spread out and metal detected (under licence to National Monuments Service) as part of the finds retrieval strategy.

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 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.

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16.5.4 EVALUATION OF IMPACTS to Unrecorded Subsurface Sites

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) - Unrecorded Subsurface Sites.

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

Table 16-28: 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)*
Complete or partial destruction (construction stage)	*Visual Impact (operational stage)*
	Decommissioning Stage Effects

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the next section – Section 16.5.4.1.

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table, in Section 16.5.4.2.

Unrecorded Subsurface Sites

Sensitive Aspect

16.5.4.1 Impact Evaluation Table: Complete or partial destruction

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Initial groundworks during the construction phase.
Cumulative Impact Source: Initial groundworks during the construction phase.
Impact Pathway: excavation of soil

Impact Description: In the event of ground works for the development encountering Unrecorded Subsurface Cultural Heritage Sites it is likely to result in the complete or partial destruction of said sites.

Impact Quality: Negative

Evaluation of the Impact of the Subject Development – Complete or partial destruction

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
By their nature, the magnitude of the impact of the development on Unrecorded Subsurface Sites cannot be determined at this stage. It is possible that previously unknown archaeological material could be impacted upon by the UWF Related Works, particularly given the high number of Cultural Heritage Sites in their environs.

Because much of the study area has been subject to intensive agriculture and later forestry planting, it is considered that Unrecorded Subsurface Sites exposed during the course of construction ground works are most likely to involve levelled earthworks, backfilled cuts, and areas of large scale burning or artefact scatters. It is unlikely that any fully intact remains of special archaeological significance will be uncovered.

The design of the development (see section 16.5.3) includes a provision for archaeological monitoring of all ground works relating to the construction. This will allow for an onsite archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to archaeologically record and preserve, either *in situ* or *by record*, any structures, features or objects of archaeological significance which may be encountered during the works.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The unknown extent of Unrecorded Subsurface Sites.
- The extent of Cultural Heritage Sites in the surrounding area
- The dominant land uses in the area, agriculture and forestry, which will mean that it will be unlikely that any fully intact remains of special archaeological significance will be uncovered.
- The monitoring of all groundworks by an on-site archaeologist, under license.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effects of UWF Related Works with UWF Grid Connection along the L2264-50 and 6188-0 where UWF Related Works Haul Route Works (H8-H12) overlap with the UWF Grid Connnection 110kV UGC along the above list roads. However the UWF Related Works haul route works are in the public road verge or adjacent to the public road and the UWF Grid Connection is within the corridor of the public road and therefore the footprint of the works do not overlap. There is also potential for cumulative effects where UWF Related Works Internal Windfarm Cabling will be constructed over the 110kV UGC (crosses over the 110kV UGC at 2 locations).

There is potential for cumulative effects of UWF Related Works with Upperchurch Windfarm along 11.1km of windfarm access roads, where the UWF Related Works Internal Windfarm Cables are proposed to be installed in the centre of these access roads.

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It is considered that there is no potential for cumulative effects, as any previously unrecorded sites if present, will only be affected by initial groundworks

No Other Projects or Activities are likely to cause cumulative impacts with UWF Related Works.

Significance of the Impact: No Cumulative Impact

Rationale for Impact Evaluation:

- Previously unknown sites can only be impacted upon by initial groundworks and not by subsequent groundworks.

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

Element 1: UWF Grid Connection

Impact Magnitude:
By their nature, the magnitude of the impact of the development on Unrecorded Subsurface Sites cannot be determined at this stage. It is possible that previously unknown archaeological material could be impacted upon by the UWF Grid Connection works, particularly given the high number of Cultural Heritage Sites in close proximity. Unrecorded Subsurface Sites are unlikely to be discovered during excavations for the 110kV UGC given the location of the 110kV within public road pavements outside of the Mountphilips Substation site.

Because much of the study area around Mountphilips Substation has been subject to intensive agriculture, it is considered that Unrecorded Subsurface Sites exposed during the course of construction ground works are most likely to involve levelled earthworks, backfilled cuts, and areas of large scale burning or artefact scatters. It is unlikely that any fully intact remains of special archaeological significance will be uncovered.
The design of the development (see section 16.5.3) includes a provision for archaeological monitoring of all ground works relating to the construction. This will allow for an onsite archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to archaeologically record and preserve, either *in situ* or *by record*, any structures, features or objects of archaeological significance which may be encountered during the works.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The unknown extent of Unrecorded Subsurface Sites.
- The extent of Cultural Heritage Sites in the surrounding area
- The location of 110kV UGC predominately within public roads;
- The dominant land uses in the area, agriculture and forestry and public roads, which will mean that it will be unlikely that any fully intact remains of special archaeological significance will be uncovered.
- The monitoring of all initial groundworks by an on-site archaeologist, under license.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 16.5.2.1.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: Over the course of the 2013 EIS, it was deemed that no known Cultural Heritage Sites would be directly or indirectly impacted by the permitted development. However, the possibility existed that previously unknown subsurface features associated with these sites it may result the complete or partial destruction of said sites.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The Board considered that, subject to compliance with the mitigation measures set out in the Environmental Impact Statement, the development would not have a significant effect on the environment.
- The application of the 2014 Grant of Permission, Condition No. 20, which will protect unknown subsurface archaeology.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 16.5.2.1.1*
Evaluation of Other Cumulative Impacts – Complete or partial destruction
Whole UWF Project Effect
Cumulative Impact Magnitude It is considered that there is no potential for cumulative effects, as any previously unrecorded sites if present, will only be affected by initial groundworks – i.e. by the UWF Grid Connection works or the UWF Related Works or the Upperchurch Windfarm only.
Significance of the Cumulative Impact: No Cumulative Impact
Rationale for Cumulative Impact Evaluation: • Previously unknown sites can only be impacted upon by initial groundworks and not by subsequent groundworks.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Unrecorded Subsurface Sites with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 16.5.2.1).

16.5.4.2 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 16-29 below.

Table 16-29: Description and Rationale for Excluded Impacts to Unrecorded Subsurface Sites

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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Operational Stage				
Above-ground structures	1, 2, 4	Visibility	Visual Impact	Rationale for Excluding: It is unlikely that a monument will be uncovered during construction works, rather that small artefacts, levelled earthworks or backfilled cuts are likely to be uncovered. These types of archaeology are considered unlikely to be sensitive to visual effects.
Decommissioning Stage				
Rationale for Excluding: There are no ground works required for decommissioning, any groundworks will be limited to those areas of ground which were previously excavated during the construction stage, therefore there is no potential for effects on Unrecorded Subsurface Sites.				

16.5.5 Mitigation Measures for Impacts to Unrecorded Subsurface Sites

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 Unrecorded Subsurface Sites as a consequence of the UWF Related Works.

16.5.6 Evaluation of Residual Impacts to Unrecorded Subsurface Sites

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Unrecorded Subsurface Sites above (Section 16.5.4) – i.e. **no significant adverse impacts**.

16.5.7 Application of Best Practice and the EMP for Unrecorded Subsurface Sites

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

16.5.8 Summary of Impacts to Unrecorded Subsurface Sites

A summary of the Impact to Unrecorded Subsurface Sites is presented in Table 16-30.

Table 16-30: Summary of the impacts to Unrecorded Subsurface Sites

Impact to Unrecorded Subsurface Sites:	**Complete or partial destruction**
Evaluation Impact Table	*Section 16.5.4.1*
Project Life-Cycle Stage	*Construction*
UWF Related Works Impact *Direct or indirect impact*	**Slight**
UWF Related Works Impact *Cumulative impact*	**No Cumulative Impact**
Element 1: UWF Grid Connection	Slight
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 16.5.2.2.1
Element 4: Upperchurch Windfarm	Slight
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 16.5.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	**No Potential for Cumulative Impact**

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 were evaluated as having potential to cause cumulative effects to Unrecorded Subsurface Sites with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 16.5.2.1).

16.6 Policy Context

16.6.1 National Policy

Archaeological heritage is protected under the National Monuments Acts 1930-2004 (as amended), the National Cultural Institutions Act 1997 and the Planning Regulations.

The European Convention on the Protection of the Archaeological Heritage provides the basic framework for policy on the protection of the archaeological heritage.

16.6.2 Regional Policy

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.

Section 7.2.1 Archaeology, of this states that the *'protection of the archaeological heritage of the Region should be addressed by the Planning Authorities, which should ensure that those sites that are of significance are retained.'* In addition, it notes that *'Planning Authorities should ensure that architectural heritage is protected in accordance with the requirements of the Planning and Development Act.'*

16.6.3 North Tipperary County Development Plan 2010 (as varied):

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.

Policy LH16: Archaeology and Cultural Heritage, of the North Tipperary County Development Plan states that, *'It is the policy of the Council to safeguard sites, features and objects of archaeological interest, including monuments on the Sites and Monuments Record (SMR), the Record of Monuments and Places (as established under Section 12 of the National Monuments (Amendment) Act, 1994) and archaeological remains found within Zones of Archaeological Potential (ZAPs) located in historic towns and other urban and rural areas. In safeguarding such features of archaeological interest, the Council will seek to secure the preservation (i.e. preservation in situ or in exceptional circumstances preservation by record) and will have regard to the advice and recommendation of the Department of Arts, Heritage and the Gaeltacht'.*

Section 7.5.3 Architectural Heritage of Local Interest relates to unrecorded built heritage as follows, *'The Council recognises that structures of architectural merit, not included in the RPS* (record of protected structures) *may make a contribution to the built fabric of local areas. These structures include the many examples of vernacular architecture or traditional building forms and types which have been built using local materials, skills and techniques. These buildings contribute, both individually and collectively to the character, heritage and identity of the county, therefore, the Council will encourage the retention, maintenance and positive re-use of such buildings and features where feasible.*

According to Policy LH15: Architectural Heritage of Local Interest; *It is the policy of the council to encourage the sympathetic restoration, re-use and maintenance of buildings/features which are considered to be of local architectural importance.'*

Best Practice Measures

16.7 Best Practice Measures

No UWF Related Works Best Practice Measures have been developed specifically for Cultural Heritage.

Topic: Cultural Heritage

16.8 Summary of the Cultural Heritage Chapter

The UWF Related Works is located on the eastern slopes of the Slievefelim – Silvermine Mountain uplands area. The Slievefelim to Silvermine Mountains upland area is a region with a rich and diverse history of human settlement going back to prehistoric times. This extended period of occupation is reflected in the archaeological record, with numerous known monuments recorded on the Record of Monuments and Places within the upland area.

Sensitive Aspects of Cultural Heritage, examined in this topic chapter, include Recorded Legally Protected Sites (sites listed on the RMP); Other Recorded sites (sites listed on the NIAH); Previously Unrecorded Sites (sites shown on historic Ordnance Survey mapping) and Unrecorded Subsurface Sites (currently undiscovered but potentially existing under the ground surface).

Within the study area for the UWF Related Works, a total of 65 Cultural Heritage Sites were identified and described. These included 24 No. Recorded Legally Protected Sites listed on the Record of Monuments and Places (RMP); and 41 Previously Unrecorded Sites shown on various editions of the historic Ordnance Survey maps which primarily consisted of wells, lime kilns, gravel pits and quarries etc.

Test excavations were carried out at 1 RMP Site, in Knockcurraghbola Commons townland, where the Internal Windfarm Cabling is routed through the zone of notification of a Recorded Legally Protected Site. Nothing of archaeological significance was recorded in the test trenches at this locations.

The UWF Related Works was evaluated for potential to damage cultural heritage sites during initial groundworks in the construction stage. The Telecom Relay Pole was evaluated for potential to cause visual impacts during its operation.

Project Design Measures will be implemented during construction works, these include the archaeological monitoring of groundworks, and the use of flagmen at temporary site access points rather than providing sightlines through the removal of roadside boundaries, some of which are also townland boundaries.

16.8.1 Summary of UWF Related Works Impacts

- No impacts are expected to Recorded Legally Protected Sites as a consequence of construction stage groundworks Due to its small scale and design (wooden pole), the visual impacts to Recorded Legally Protected Sites are expected to be Imperceptible and and cumulatively will be Not Significant.
- As there are no Other Recorded Sites in the UWF Related Works Study Area, there is no potential for impacts to these Sites,
- The construction stage groundworks will cause the removal of small sections of townland boundaries, mainly along the route of Internal Windfarm Cabling. Adverse impacts to Previously Unrecorded Sites are expected to be no greater than Slight,.
- Any damage to Unrecorded Subsurface Sites is expected to be no greater than Slight, this is due to the monitoring of all works, and in the context of agricultural and forestry landuses in the works areas.

16.8.2 Summary of UWF Related Works Cumulative Impacts

- No cumulative impacts are expected to Recorded Legally Protected Sites as a consequence of construction stage groundworks of UWF Related Works and other works in the area i.e Upperchurch Windfarm and UWF Grid Connection due to separation distance from these Sites.

- The cumulative visual impacts to Recorded Legally Protected Sites, of the Telecoms Relay Pole with other Telecoms Masts in the area will be negligible and with the Consented UWF turbines and operating Milestone WF turbines will not have a greater magnitude of impact than the cumulative impact of these structures themselves.
- As there are no Other Recorded Sites in the UWF Related Works Study Area, the project has no potential to cause impacts by itself and therefore cannot have a cumulative effect.
- The construction stage groundworks will cause the removal of small sections of townland boundaries, mainly along the route of Internal Windfarm Cabling and at townland boundary crossing points for Upperchurch Windfarm. Adverse impacts to Previously Unrecorded Sites are expected to be no greater than Slight due to the scale of the works and previous alterations to these boundaries.
- There is expected to be no cumulative damage to Unrecorded Subsurface Sites as damage to these can only occur during initial ground works and not subsequent.

16.8.3 Summary of Cumulative Impacts with the 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 (in particular the UWF Grid Connection and Upperchurch Windfarm).

- Cumulative effects with the Other Elements are limited to Previously Unrecorded Sites, where 2 townland boundaries will be effected by both the UWF Related Works and the UWF Grid Connection, and 2 other townland boundaries will be effected by both the UWF Related Works and Upperchurch Windfarm works. Adverse cumulative impacts to Previously Unrecorded Sites, as a result of these three Elements, are expected to be no greater than Slight.
- There is no potential for cumulative construction stage impacts to Unrecorded Subsurface Sites as it is considered that a cultural heritage site will only be affected by the initial works.
- In relation to Recorded Legally Protected Sites, the cumulative visual impact caused by the Telecom Relay Pole (UWF Related Works) cumulatively with the Consented UWF Turbines, is considered Not Significant.

16.8.4 Summary of the Cumulative Impacts with Other Projects or Activities

Cumulative impacts with Other Projects or Activities relates to cumulative impacts of the UWF Related Works together with Other Projects (Milestone Windfarm, Foilnaman Mast and Cummermore Communications Pole).

- Cumulative effects to Recorded Legally Protected Sites will be no greater than Imperceptible Adverse as a consequence of the UWF Related Works cumulatively with Other Projects.
- Cumulative effects to Previously Unrecorded Sites will be no greater than Slight Adverse as a consequence of the UWF Related Works cumulatively with Other Projects.
- There is no potential for cumulative effects with Other Recorded Sites or Unrecorded Subsurface Sites.

16.9 Reference List

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REFERENCE DOCUMENTS

UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 17: Landscape

Topic Chapter Authors:

EIAR Coordinator:

January 2019

Topic Landscape

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Landscape Topic

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

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Appendix 17.1	Contextual Photographs and Theoretical Visibility within the Study Areas

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

Glossary of Terms

Term	Definition
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.

List of Abbreviations

Abbreviation	Full Term
BPM	Ecopower Best Practice Measure developed by members of the EIAR Team
LVIA	Landscape and Visual Impact Assessment
LCT	Landscape Character Type
LCA	Landscape Character Area
PD	Ecopower Project Design Environmental Protection Measure developed by members of the EIAR Team
ZTV	Zone of Theoretical Visibility
RZTV	Reverse Zone of Theoretical Visibility
IEMA	Institute of Environmental Management and Assessment
GLVIA	Guidelines for Landscape and Visual Impact Assessment
UGC	Underground Cables

Abbreviation	Full Term
UWF	Upperchurch Windfarm

17 Environmental Factor: Landscape

17.1 Introduction to the Landscape Chapter

17.1.1 What is Landscape?

Landscape is an area perceived by people, whose character is the result of the action and interaction of natural and/or human factors[1]. Landscape is about the relationship between people and place it provides the setting for our day-to-day lives. The term does not mean just special or designated landscapes and it does not only apply to the countryside. Landscape can mean a small patch of urban wasteland as much as a mountain range, as much as an expansive lowland plain. It results from the way that different components of our environment - both natural (the influence of geology, soils, climate, flora and fauna) and cultural (the historical and current impact of land use, settlement, enclosure and other human interventions are perceived by us. People's perceptions turn land into the concept of landscape[2].

17.1.2 Overview of Landscape in the Local Environment

The landscape setting of the UWF Related Works is that of a rugged rural upland comprising of moderate and steep sided valleys that are cloaked in a combination of forestry and agricultural grassland. Aside from the small settlements of Upperchurch and Kilcommon the rural population is relatively sparse and dispersed.

The location of the UWF Related Works is illustrated on OSI Mapping on Figure RW 17.1: Location of the UWF Related Works.

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

17.1.3 Sensitive Aspects of the Landscape 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	Landscape Character	Section 17.2
Sensitive Aspect No. 2	Visual Amenity	Section 17.3

Each of the above listed Sensitive Aspects are evaluated individually in Sections 17.2 to 17.3 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 17.2 to 17.3. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

[1] European Landscape Convention (2002),
[2] Guidelines for Landscape and Visual Impact Assessment (2013)

17.1.4 Sensitive Aspects excluded from further evaluation

No Sensitive Aspects were excluded from this topic chapter.

17.1.5 Overview of the Subject Development

The UWF Related Works are the subject development, being the subject of this appeal to An Bord Pleanála. The main parts of the UWF Related Works are identified in Table 17-1 below.

Table 17-1: 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.

17.1.6 The Authors of the Landscape Chapter

This report was written by Richard Barker, Master Landscape Architecture and corporate member of the Irish Landscape Institute, of Macro Works consultancy. Richard's experience includes the landscape and visual impact assessment of more than 90 wind energy development proposals including 5 no. Strategic Infrastructure Development (SID) projects, numerous linear infrastructure projects including road schemes, electricity transmission lines (overhead and underground) as well as water and sewage pipelines. Macro Works specialise in visual impact analysis and visual impact graphics.

17.1.7 Sources of Baseline Information

The information sources outlined in Table 17-2 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 17-2: Sources of Baseline Information for Landscape

Type	Source
Consultation	Feedback was received from • Members of the public during the Public Consultation and Information Day See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details..
Guidelines	• Institute of Environmental Management and Assessment (IEMA) • Landscape Institute (UK) 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA, 2013, 3rd Edition).
Desktop	• North Tipperary County Development Plan 2010 (as varied)

Type	Source
	• South Tipperary County Development Plan 2009 (as varied) • Landscape Character Assessment for County Tipperary (2016) • Online research and review of this EIA Report Chapter 6: Population to establish key tourist and amenity features, including waymarked walking and cycling routes in the study area • Chapter 9: Land • Chapter 8: Biodiversity 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 • An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 • An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040
Fieldwork	• Site Visit • Baseline photography

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

17.1.7.1 Certainty and Sufficiency of Information Provided

A clear documentary trail is provided throughout this chapter and chapter appendices 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 in particular, the North Tipperary County Development Plan 2010 (as varied). In all cases the most recent publications are relied on. All documentation used is referenced at the end of the chapter.

In respect of Landscape no significant limitations or difficulties were encountered.

17.1.8 Methodology for Evaluating Effects

17.1.8.1 Landscape Evaluation Criteria

The criteria used by Macro Works for landscape and visual appraisals are derived from the above IEMA and GLVIA Guidelines (see Table 17-2). Whilst this is specific to the landscape and visual appraisal, the significance judgements correspond closely with the EPA significance criteria with the main point of note being that 'Substantial' impacts are equivalent to the EPA definition for 'Significant' impacts. The landscape and visual criteria are set out below.

When assessing the potential impacts on the landscape resulting from the development, the following criteria are considered:

- Landscape character, value and sensitivity
- Magnitude of likely impacts; and
- Significance of landscape effects

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (LCA) or feature) can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. Landscape sensitivity is classified using the criteria in Table 17-3.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the proposal site boundary that may have an effect on the landscape character of the area. The magnitude of landscape impact is classified using the criteria in Table 17-4.

Table 17-3: Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically, this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

Table 17-4: Magnitude of Landscape Impacts

Magnitude of Landscape Impact	Description
Very High	Permanent change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
High	Permanent or long-term change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
Medium	Permanent or long-term changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality. Alternatively, Medium term, short term or temporary changes of greater extent and scale.
Low	Permanent or long-term Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements. Alternatively, short term or temporary changes of greater scale and extent.
Negligible	Permanent changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable. Alternatively, temporary changes of slightly greater extent and scale

17.1.8.2 Visual Impact Criteria

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape.

In accordance with the IEMA Guidelines for Landscape and Visual Assessment, receptor type was used to estimate the level of sensitivity for a particular visual receptor, as outlined in Table 17.5.

Table 17-5: IEMA Criteria for Evaluating the Sensitivity of Visual Receptors

Visual receptors most susceptible to changes in views and visual amenity	**Visual receptors that are less susceptible to changes in views and visual amenity**
Residents at home;	People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape; and
People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;	People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life
Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;	
Communities where views contribute to the landscape setting enjoyed by residents in the area; and	
Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened	

The magnitude of visual impacts relates to the likely scale and nature of visual change in relation to the representative receptor location. It considers whether the proposal will be a visual obstruction (blocking a view) or just an intrusion on the view and how much of the view is affected. It is also a measure of whether the visual change is temporary or permanent and if such change conflicts or complements other elements within the scene in terms of tone, texture, scale and function for example. The textual criteria for determining visual impact magnitude are set out in Table 17.6.

Table 17-6: Magnitude of Visual Impacts

Criteria	Description
Very High	The proposed development is a permanent visual obstruction or intrusion into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene
High	The proposed development is a permanent or long term visual obstruction or intrusion into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene.
Medium	The proposed development represents a permanent or long-term intrusion into a moderate proportion of the available vista. It is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order judgements in relation to visual presence and visual amenity or a shorter duration.
Low	The proposed development represents a permanent or long-term intrusion into a minor proportion of the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene. Alternatively, it may represent short term or temporary visual intrusion of a greater extent.
Negligible	The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene. Alternatively, it may represent short term or temporary visual intrusion of a slightly greater extent.

17.1.8.3 Significance of Landscape and Visual Impacts

The significance of both landscape and visual impacts is based on a balance between the sensitivity of the landscape / visual receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the matrix in Table 17-7.

Table 17-7: Landscape and Visual Impact Significance Matrix

	Sensitivity of Receptor				
Scale/Magnitude	***Very High***	***High***	***Medium***	***Low***	***Negligible***
Very High	Profound	Profound-substantial	Substantial	Moderate	Minor
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

***Note**: The significance matrix provides an indicative framework from which the significance of impact is derived. The significance judgement is ultimately determined by the assessor using professional judgement. Due to nuances within the constituent sensitivity and magnitude judgements, this may be up to one category higher or lower than indicated by the matrix. Judgements indicated in orange are considered to be 'significant impacts' in EIA terms (EPA definitions).*

17.2 Sensitive Aspect No.1: Landscape Character

This Section provides a description and evaluation of the Sensitive Aspect - Landscape Character.

17.2.1 BASELINE CHARACTERISTICS of Landscape Character

17.2.1.1 STUDY AREA for Landscape Character

The study area for Landscape Character in relation to the UWF Related Works is described in Table 17-8 and illustrated on Figure RW 17.2: Landscape Character within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 17-8: UWF Related Works Study Area for Landscape Character

Study Area for Landscape Character	Justification for the Study Area Extents
500m corridor from construction works areas 2km radius from Telecom Relay Pole	Distances outside of which, each aspect of the development could not materially affect prevailing landscape character

17.2.1.2 Baseline Context and Character of Landscape Character in the UWF Related Works Study Area

The Landscape of the UWF Related Works Study Area is contained within an extensively managed upland rural landscape of farmland and forestry within the eastern extents of the Slievefelim to Silvermine Mountains upland area. See Appendix 17.1: Contextual Photographs and Theoretical Visibility within the Study Areas for contextual photographs illustrating the physical land cover of the receiving environment.

The landscape is wholly rural (agriculture) in terms of land use and character, but varies slightly from typical upland agriculture to typical lowland agriculture. A recently updated Landscape Character Assessment (2016) is contained within the Tipperary Country Development Plan (2010 as varied) and this identifies that the overall landscape context is contained within Landscape Character Areas (LCAs) '17 – Upperchurch, Kilcommon & Hollyford Mountain Mosaic'. Within LCA17 there is a relatively tranquil upland rural landscape character of low intensity land uses including pastoral farming and forestry with a sparse and dispersed population.

The location of UWF Related Works in relation to LCA17 is illustrated on Figure RW 17.1.

17.2.1.3 Importance of Landscape Character

Neither the upland nor lowland agricultural landscape within the study area is particularly rare or distinctive in a national or regional context. However, the tranquillity of the upland areas and the pastoral qualities of the lowland areas contributes to the rural amenity of residents in this area. The productive agricultural land uses also contribute to the subsistence of the rural lifestyle enjoyed by the local population.

17.2.1.4 Sensitivity of Landscape Character

The tranquil rural landscape character of the uplands contribute to the 'Class 3 - sensitive' sensitivity classification for LCA 17 in the Tipperary Landscape Character Assessment.

In a general sense, the prevailing rural landscape character in these areas is sensitive to permanent changes to landscape patterns and features, which contribute to that character. It is also sensitive to the introduction of new and unfamiliar development, particularly that which includes intensive built development of a typically non-rural nature. Based on the universal landscape sensitivity criteria identified

in Table 17.3 it is considered that the 'Class 3 – sensitive' landscape sensitivity classification from the Tipperary Landscape Character Assessment (classification specific to that document) corresponds to a 'Medium' landscape sensitivity for LCA17 – 'Upperchurch, Kilcommon & Hollyford Mountain Mosaic' for the purposes of this appraisal.

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

In recent years the strongest trend in the wider upland areas in the south and southeast of the Slievefelim to Silvermine Mountain upland area is the emergence of wind energy developments on upper slopes and ridges along with the ancillary development of roads and electrical infrastructure. This trend is likely to continue further to the north and west of these developments as the currently under-construction Milestone Windfarm becomes operational and the currently permitted wind energy developments such as Upperchurch, Bunkimalta and Castlewaller Windfarms are constructed.

However, the predominant rural land use matrix of farming and forestry within the study area or wider upland area h as not noticeably changed in recent years and is unlikely to change markedly or rapidly in the foreseeable future (see Chapter 9: Land).

17.2.1.6 Receiving Environment (the Baseline + Trends)

The identified trends are occurring gradually and in a consistent manner, so it is assumed in this report that the receiving landscape will be a very similar baseline environment to that identified above, albeit with Milestone Windfarm making the wind energy development a more characteristic feature of the overall rural landscape character, particularly in LCA17.

17.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

17.2.2.1 Cumulative Evaluation Study Areas

17.2.2.1.1 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 Landscape Character	Justification for the Study Area Extents
Cumulative construction effects: 1km corridor from UWF Related Works construction works areas Cumulative operational effects; 4km radius from Telecoms Relay Pole	Distances outside of which, the construction works or Telecoms Relay Pole could not have a material cumulative effect on prevailing landscape character or visual amenity – i.e. any effects beyond 500m from construction works or 2km from the Telecom Relay Pole will be Neutral, on the basis that the proposed development will have become a negligible component of the broader scale landscape fabric.

The study is illustrated on **Figure CE 17.2: Landscape Character within the UWF Related Works Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

17.2.2.1.2 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.

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 17-9 and illustrated on Figure WP 17.2: Landscape Character within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 17-9: Whole Project Cumulative Evaluation Study Area for Landscape Character

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	500m corridor from works areas and activity locations 2km radius from above ground level structures	Distances outside of which, the Mountphilips Substation, UWF Replacement Forestry could not have a material cumulative effect on prevailing landscape character or visual amenity – i.e. any effects beyond 2km from the aforementioned elements will be Neutral. Any cumulative landscape character and visual amenity impacts beyond these study areas will only relate to the presence of cumulative turbines in views containing the Consented UWF Turbines, the cumulative impacts of which have previously been assessed as acceptable by An Bord Pleanála.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

17.2.2.2 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Landscape Character 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 Landscape Character 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. 17).

The results of this scoping exercise are that: Milestone Windfarm, Foilnaman Mast, Cummermore Communications Pole and the activities of Forestry and Agriculture have been scoped in for evaluation of cumulative effects to Landscape Character. 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 17.2 (Volume C3 EIAR Figures). The baseline character of the areas around these projects is described in Section 17.2.2.3.

17.2.2.2.1 Potential for Impacts to Landscape Character

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 Landscape Character. The results of this evaluation are included in Table 17-10.

Table 17-10: 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	Evaluated as excluded: Neutral effects/No Effects due to: • Upperchurch Hen Harrier Scheme: Once off activities will take place during the construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will not generate any adverse effects to visual amenity. • Haul Route Activities: It is considered that there will be Neutral effects to landscape character, as there will be no disturbance of land cover, and any tree trimming will be in the context of road boundary tree trimming that regularly takes place along the public road network, and the presence of any machinery in the context of busy regional and national roads. • Overhead Line Activities do not require any works to land and any brief visibility of such minor works will have no effect on landscape character. • Monitoring Activities do not require any works to land, no effects to landscape character are expected from brief periods of very minor activity

Other Projects or Activities	
Milestone Windfarm Foilnaman Mast Cummermore Communications Pole	Yes, included for the evaluation of cumulative operational stage effects, Excluded from evaluation in relation to cumulative construction stage effects as the Foilnaman Mast and Cummermore Communications Pole already exist and are considered part of the baseline. The Milestone Windfarm is currently under construction and will be completed by the time construction begins for the UWF Related Works or any Other Element of the Whole UWF Project, therefore Milestone Windfarm is outside the timeframe boundary for construction stage impacts.
Forestry activities Agricultural activities	Yes, included for the evaluation of cumulative construction stage effects, Excluded from evaluation in relation to cumulative operational stage effects as these activities are the prevailing and characteristic land uses in this area, i.e. they are the baseline rather than other sources of impact.

17.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

17.2.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

The Landscape of the UWF Grid Connection Study Area is contained within a combination of a rolling lowland rural landscape of fields and hedgerows at its western end in the vicinity of Newport, transitioning into a more extensively managed upland rural landscape of forestry and farmland within the Slievefelim to Silvermine Mountains throughout the central and eastern extents. See Appendix 17.1: Contextual Photographs and Theoretical Visibility within the Study Areas for contextual photographs illustrating the physical land cover of the receiving environment.

The Mountphilips Substation element of the UWF Grid Connection along with the westernmost 8km of the 110kV UGC are contained within the rolling lowland farmland context around Newport. The remaining c.20.5km of the 110kV UGC will be contained within the upland rural context of the Slievefelim to Silvermine Mountains.

The landscape encompassed by the Whole UWF Project is wholly rural (agriculture) in terms of land use and character, but varies slightly from typical upland agriculture to typical lowland agriculture. A recently updated Landscape Character Assessment (2016) is contained within the Tipperary Country Development Plan (2010 as varied) and this identifies that the uplands portions of the overall landscape context are contained within Landscape Character Areas (LCAs) '17 – Upperchurch, Kilcommon & Hollyford Mountain Mosaic' and '18 – 'Silvermines – Rearcross'. The westernmost lowland area is contained within 'LCA12 River Shannon – Newport'. Within LCA17 and LCA18 there is a relatively tranquil upland rural landscape character of low intensity land uses including pastoral farming and forestry with a sparse and dispersed population. Within the Lowland landscape of LCA12 River Shannon – Newport the population density is slightly greater and the land is farmed more intensively. Here the landscape character is more of a traditional pastoral one within gently rolling terrain.

The location of UWF Grid Connection in relation to LCA17, LCA18 and LCA12 is illustrated on Figure WP 17.2.

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the LCA-17 'Upperchurch, Kilcommon Hollyford Mountain Mosaic' where the 110kV UGC is located in the public roads R503 at Knocknabansha, and then along the L2264-50 and L-6188-0 and along the forestry road to the Consented UWF Substation.

17.2.2.3.2 Element 3: UWF Replacement Forestry

The Landscape of the UWF Replacement Forestry Study Area is contained within an extensively managed upland rural landscape of farmland and forestry within the eastern extents of the Slievefelim to Silvermine Mountains upland area. See Appendix 17.1: Contextual Photographs and Theoretical Visibility within the Study Areas for contextual photographs illustrating the physical land cover of the receiving environment.

The landscape is wholly rural (agriculture) in terms of land use and character, but varies slightly from typical upland agriculture to typical lowland agriculture. A recently updated Landscape Character Assessment (2016) is contained within the Tipperary Country Development Plan (2010 as varied) and this identifies that the overall landscape context is contained within Landscape Character Areas (LCAs) '17 – Upperchurch, Kilcommon & Hollyford Mountain Mosaic'. Within LCA17 there is a relatively tranquil upland rural landscape character of low intensity land uses including pastoral farming and forestry with a sparse and dispersed population.

The location of UWF Replacement Forestry in relation to LCA17 is illustrated on Figure WP 17.2.

17.2.2.3.3 Element 4: Already Consented Upperchurch Windfarm

Upperchurch Windfarm is also located within the upland rural context of the Slievefelim to Silvermine Mountains upland area, in LCA17.

Consideration of the Passage of Time: With the exception of the Milestone Windfarm, which is now operational, there has been no material change in the landscape character in the Upperchurch Windfarm area. It should be noted that Milestone Windfarm was considered cumulatively in the 2013/2014 planning assessments, and therefore the descriptions in the 2013 and 2014 documents remain relevant to the cumulative evaluations in this Revised EIAR.

17.2.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 17.2.2.2.1

17.2.2.3.5 Other Projects or Activities

Milestone Windfarm (currently under construction) and the existing Foilnaman Mast, Cummermore Communications Pole are also located within the upland rural context of the Slievefelim to Silvermine Mountains, where forestry and agriculture are the main land uses.

17.2.2.4 Cumulative Information Baseline Characteristics - Sensitivity of Landscape Character

In relation to UWF Grid Connection, the tranquil rural landscape character of the uplands and the traditional pastoral aesthetic of the lowlands contribute to the 'Class 3 - sensitive' sensitivity classification for LCA 17 and LCA18 and the 'Class 4 – transitional vulnerability' classification for LCA12 in the Tipperary Landscape Character Assessment.

Based on the landscape sensitivity criteria identified in Table 17-3, the 'Class 3 - sensitive' sensitivity classification for LCA 17 and LCA18 is considered to correspond to a 'Medium Sensitivity', while the 'Class 4 – transitional vulnerability' classification for LCA 12 is considered to correspond to a 'High medium' sensitivity for the purposes of this appraisal.

17.2.3 PROJECT DESIGN MEASURES for Landscape Character

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 17-11 are relevant to the Environmental Factor, Landscape, and in particular to the sensitive aspect **Landscape Character**.

Table 17-11: UWF Related Works Project Design Measures relevant to Landscape Character

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.
PD03	Construction works in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Grid Connection or Upperchurch Windfarm.

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 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.

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17.2.4 EVALUATION OF IMPACTS to Landscape Character

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) - Landscape Character.

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

Table 17-12: 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)*
Alteration or division of land cover and vegetation patterns (construction stage)	*Intensification of activity causing a reduction in rural tranquillity (operational stage)*
Intensification of activity causing a reduction in rural tranquillity (construction stage)	*Decommissioning Effects*
Intensification of built development and reduction in the integrity of rural landscape patterns (operational stage)	

The source-pathway-receptor links for included impacts are described in the **Impact Evaluation Tables,** which are presented in the **following sections 17.2.4.1 to 17.2.4.3.**

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 17.2.4.4.

Topic: Landscape

17.2.4.1 Impact Evaluation Table: Alteration or division of land cover and vegetation patterns

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation of soil, and vegetation removal
Cumulative Impact Source: Excavation of soil, and vegetation removal
Impact Pathway: Physical land cover disturbance / change

Impact Description: Temporary change to physical landscape elements in the form of excavation, removal or disruption of soils, grassland, forestry, scrub, hedgerows and riparian vegetation that will impact on the integrity of landscape patterns that contribute to the salient rural landscape character of the area.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Alteration or division of land cover and vegetation patterns

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
In total 20.9ha of construction works areas associated with the UWF Related Works will be carried out in LCA-17. Excavation and soil removal/disruption will take place in all construction works areas, 0.3ha of forestry will be felled along with the removal of 170m of hedgerow comprising primarily earthen banks and 4 No. mature trees, mainly along public road boundaries. Riparian habitat will be temporarily removed at 6 No. crossing points of watercourses along the routes of the Internal Windfarm Cabling and Realigned Windfarm Roads.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

As per Table 17-3, the Negligible magnitude combined with the medium sensitivity of LCA-17
compliance with the 'wise use and best choice' objective to maintain and enhance established patterns for LCA-17
In the context of the extensive size of LCA-17
the typical and abundant nature of the affected land cover elements
The predominantly temporary duration and
the reversibility of the impact with the restoration of the prevailing land cover over the vast majority of construction works areas.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects is limited to LCA-17, where works associated with UWF Related Works and Upperchurch Windfarm, UWF Replacement Forestry and UWF Grid Connection all occur.

The magnitude of cumulative impacts is reduced by the colocation of c.60% of Internal Windfarm Cabling in Upperchurch Windfarm roads, these works will be carried out by Upperchurch Windfarm crews and will not cause any noticeable increase in intensification.

UWF Related Works will only alter small and independent sections of land cover and vegetation that will be temporarily disrupted and restored independently, thereby avoiding noticeable cumulative effects. UWF Grid Connection works will be confined to the public road and will not cause any disturbance to surrounding lands. Planting works associated with UWF Replacement Forestry will be carried in the general vicinity of some UWF Related Works and Upperchurch Windfarm construction works locations, however the planting works will have a negligible magnitude of land disturbance. The overall magnitude of cumulative impact is therefore deemed to be

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Low-negligible.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- The relatively small extent of works for UWF Related Works in LCA-17
- The overlap of UWF Related Works on Consented UWF Roads;
- the typical and abundant nature of the affected land cover elements
- the predominantly temporary duration and the reversibility of the impact with the restoration of the prevailing land cover over the vast majority of construction works areas.
- The small extent of works for UWF Grid Connection and UWF Replacement Forestry in LCA-17
- the Low-negligible magnitude of impact in the context of the extensive size and medium sensitivity of landscape character area LCA-17

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

Element 1: UWF Grid Connection

Impact Magnitude:
In total 39.1ha of construction works areas will be carried out in the three LCAs – LCA-12 (9.0ha), LCA-18 (14.5ha) and LCA-17 (6.5ha).
Excavation will take place in all construction works areas, however excavations for the 110kV UGC will be mainly within the public road pavement.
Soil removal/disruption change of landcover, and removal of hedgerows is limited to the Mountphilips Substation and associated new access road. Hedgerow removal at Mountphilips will comprise the removal of 45m of hedgerow from 2 no. locations of 35m and 10m in length and 2 No. Immature trees, both in the open countryside. The hedgerow at the permanent site entrance in Coole will be removed and reinstated behind sightlines.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 17-3, the Negligible magnitude combined with the medium to high sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18 compliance with the 'control' of unavoidable new development objective for LCA-12 and the 'wise use and best choice' objective to maintain and enhance established patterns for LCA-17 and LCA-18 in the context of the size of the landscape character areas (LCA-12: c 6,700Ha, LCA-17: c.34,100Ha and LCA-18: c.18,800Ha) the typical and abundant nature of the affected land cover elements
- The predominantly temporary duration of effects.

Element 3: UWF Replacement Forestry

Impact Magnitude:
Change of 6 hectares, of agricultural grassland to plantation forestry in LCA-17. Minimal excavation of soils due to the planting of the new native woodland by hand. No removal of hedgerows or riparian habitats.

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Topic

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

The small scale of the native woodland planting area adjacent to existing forested areas in a wider landscape that is defined by a combination of forestry and farmland
The negligible magnitude of land disturbance required during planting operations
The temporary nature of forest planting activities.

Element 4: Consented Upperchurch Windfarm

Impact Magnitude:
As per the ABP Inspectors Report (2014, Section 2), "In overall terms the principle of locating windfarm

development in the area which is the subject of this appeal is reasonable". The LVIA for the Upperchurch Windfarm, which was considered by the inspector, found the physical impact on landscape features and impact on landscape character to be of a Low magnitude. The significance of landscape impact was deemed to be 'Low negligible' - equivalent of 'Slight-imperceptible' in respect of terminology used herein.

Significance of the Impact: Slight - Imperceptible

Rationale for Impact Evaluation:

The negligible to low magnitude of change within a relatively small area of agricultural and forested land being disturbed during construction in the context of the extensive landscape character areas contained within the study area where the affected land cover elements are typical and abundant.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 17.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Forestry /Agriculture

Impact Magnitude:
Forestry harvesting operations are periodic, of a modest scale and are a typical activity of the Slievefelim to Silvermines Mountains upland area resulting in familiar cutover forestry compartments with associated track widening and processing pads. Forest growth is also typical of these LCAs, with forest plots at various stages of growth located throughout the study area.

Significance of the Impact: Slight - Imperceptible

Rationale for Impact Evaluation:

The modest scale and temporary nature of forest harvesting activities
The reversibility of forest harvesting operations through forest replanting or agricultural conversion.

Evaluation of Other Cumulative Impacts – Alteration or division of land cover and vegetation patterns

Whole UWF Project Effect

Cumulative Impact Magnitude:

UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm works areas occur across three Landscape areas; LCA-12, LCA-18 and LCA-17, and three of these Elements overlap in the Knocknabansha, Knockmaroe and Knockcurraghbola area. However, the temporary disturbance of land cover in the Knocknabansha, Knockmaroe and Knockcurraghbola area will not occur at the same time, as the developer has committed to undertake the works for the UWF Grid Connection, UWF Related Works and the Upperchurch Windfarm separately to avoid cumulative impacts to local residents.

UWF Related Works will only alter small and independent sections of land cover and vegetation, including at Foilnaman where the UWF Replacement Forestry is also located, that will be temporarily disrupted and restored independently, thereby avoiding noticeable cumulative effects.

With the exception of Mountphilips Substation, UWF Grid Connection is located on the public road. Planting works associated with UWF Replacement Forestry will be carried in the vicinity of some UWF Related Works and Upperchurch Windfarm construction works locations, however the planting works will have a negligible magnitude of land disturbance. The overall magnitude of cumulative impact is therefore deemed to be Low-negligible.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

The small extent of works for the UWF Grid Connection and the UWF Related Works in the Knockmaroe

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and Knockcurraghbola area
the Low-negligible magnitude of impact in the context of the extensive size and medium sensitivity of landscape character area LCA-17

- The negligible magnitude of the UWF Replacement Forestry

the typical and abundant nature of the affected land cover elements
the predominantly temporary duration and the reversibility of the impact with the restoration of the prevailing land cover over the vast majority of construction works areas.

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

Cumulative Impact Magnitude:
During construction, the various elements of the Whole UWF Project in conjunction with periodic forest harvesting operations will result in discrete areas of land cover disturbance and vegetation removal. This will result in very minor impacts on the integrity and uniformity of the rural landscape fabric of the subject LCAs. The UWF Replacement Forestry will not cause noticeable cumulative effects, given negligible magnitude of planting works associated with this Element.

Cumulative Impact with Other Projects: Slight to Imperceptible

Rationale for Cumulative Impact Evaluation:

The small scale and discrete areas of land cover that are affected, which are also typical and abundant in these LCAs.
The temporary nature of construction works
The reversibility of the vast majority of the WWP works and forest harvesting through reinstatement / re-planting

Note: No cumulative evaluation of Other Projects or Activities (Milestone Windfarm, Foilnaman Mast, Cummermore Communications Pole) is included in the table above, because these Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 17.2.2.2.1).

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17.2.4.2 Impact Evaluation Table: Intensification of activity causing a reduction in rural tranquillity

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction related activities
Cumulative Impact Source: Construction related activities, forestry harvesting
Impact Pathway: Visibility

Impact Description:
Construction activity will include the near constant movement, during daylight hours, of machinery, vehicles and people to and from both linear and fixed working areas. Temporary fencing and welfare facilities will be erected and there will be temporary stockpiling of excavated materials and construction materials. This intensity of construction activity is not typical of baseline land uses in this rural area and will detract from the tranquillity that forms an integral part of the rural landscape character in these LCAs. Works along the public road, involving trenching and road widening works in the verge/boundary; are unlikely to detract from rural tranquility and will generally be perceived as road works, which are a common occurrence on the public road network.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Intensification of activity causing a reduction in rural tranquillity

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Construction activities will involve single 3-4 man crews each using an excavator and dump truck and working linearly at Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works locations. Construction activities at the Telecoms Relay Pole will be at a fixed location but will be minimal and will not be noticeable in the context of the windfarm construction works which will be carried out at the same time. It is considered that the reduction in rural tranquillity arising from the intensification of activity will have a negligible impact magnitude due to the small scale and somewhat transient nature of the construction activities within a relatively broad site area that will disperse the intensity of construction activity, even if it is all occurring at once.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

As per Table 17-4, the negligible magnitude combined with the medium sensitivity of LCA-17 compliance with the 'wise use and best choice' objective to maintain and enhance established patterns for LCA-17
In the context of the size of LCA-17,
The transient and dispersed nature of construction activity for this project element.
The temporary duration of construction activities and
The reversibility of effects once temporary construction areas and compounds are cleared and restored.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effects relating to the Upperchurch Windfarm area, where both Internal Windfarm Cabling, Realigned Windfarm Roads and Telecom Relay Pole works will be carried out on the Upperchurch Windfarm. However, the scale of in-combination effects is limited by the co-location of c.62% of Internal Windfarm Cabling within Consented UWF Roads, the extremely small footprint of the Telecom Relay Pole, and the fact that Realigned Windfarm Roads will replace sections of Consented UWF Roads rather than adding to cumulative lengths of road. The UWF Related Works will be carried out by Upperchurch Windfarm crews and will not cause any noticeable addition to the loss in rural tranquillity caused

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by Upperchurch Windfarm on its own.

Cumulative effects may occur outside the Consented UWF footprint in Foilnaman where both Internal Windfarm Cabling and UWF Replacement Forestry works will take place.

Forestry operations are not likely to cause noticeable cumulative effects due the very small extent of UWF Related Works on forestry lands.

Cumulative effects with the UWF Grid Connection may occur in the Knockmaroe, Knockcurraghbola Commons, Knockcurraghbola Crownlands area where Haul Route Works and Internal Windfarm Cabling works are located close to UWF Grid Connection 110kV UGC works. However, UWF Grid Connection works in this area are confined to the public road network at these locations.

The overall magnitude of cumulative impact is therefore deemed to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- The overlap of UWF Related Works on Consented UWF Roads;
- The small scale of additional works associated with UWF Related Works on the UWF site;
- the predominantly temporary duration and the reversibility of the impact with the restoration of the prevailing land cover over the majority of construction works areas.
- The modest scale and extent of construction activities with somewhat transient working areas dispersed across a relatively broad area of undulating topography (albeit with some common compound and welfare facilities for Upperchurch Windfarm and the UWF Related Works)
- the Low-negligible magnitude of impact in the context of the extensive size and medium sensitivity of landscape character area LCA-17

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

Element 1: UWF Grid Connection

Impact Magnitude:
The greatest intensity and duration of construction related activity for the UWF Grid Connection will occur at the Mountphilips Substation site which also includes a temporary construction compound that will provide office, welfare, storage and parking facilities to construction workers. The Mountphilips Substation site is well contained by existing terrain and vegetation, which will restrict the extent to which construction activity can impact the surrounding landscape character, and as a result the impact magnitude is Low negligible.

Along the route of the 110kV UGC, which is entirely located on the public road network, there will be up to 6 No. construction crews, each made up of 4-5 men, a large excavator and a dump truck or tractor and trailer, working from 6 separate locations along the 110kV UGC. While some sections of the 110kV UCG will be more visually exposed, than the substation, the intensity and duration of trenching works will be much lower and due to the largely transient nature (moving through the landscape) of construction works along the 110kV UGC, only short sections of the works for the 110kV UGC will be perceived from most locations in the study area, and it is considered the impact magnitude is Low negligible.

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Significance of the Impact: Slight Imperceptible

Rationale for Impact Evaluation:

- As per Table 17-4, the Low negligible magnitude combined with the medium to high sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18
- The small extent and visual containment of Mountphilips Substation works (including the new access road) and the small scale, transient nature of the 110kV UGC trenching works
- The temporary duration of construction activities and the reversibility of effects once temporary con-

struction areas along the road are reinstated, which will not contravene the 'control' of unavoidable new development objective for LCA-12 and the 'wise use and best choice' objective to maintain and enhance established patterns for LCA-17 and LCA-18

Element 3: UWF Replacement Forestry

Impact Magnitude:
Very low intensity planting activities involving the delivery and temporary storage of seedlings prior to hand planting by a small team of workers over a very short time period will have a negligible reduction in rural tranquillity.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

The medium sensitivity of LCA-17and the negligible magnitude of impacts due to the small extent and intensity of planting activities
compliance with the 'wise use and best choice' objective to maintain and enhance established patterns for LCA-17
The perception of the activities as typical rural activities in this landscape, which include forest planting
The temporary duration of planting activities

Element 4: Consented Upperchurch Windfarm

Impact Magnitude:
As per the ABP Inspectors Report (2014, Section 2), "In overall terms the principle of locating windfarm development in the area which is the subject of this appeal is reasonable". The LVIA for the Upperchurch Windfarm, which was considered by the inspector, found the impact on landscape character to be of a Low magnitude. The overall significance of landscape impact was deemed to be 'Low negligible' - equivalent of 'Slight-imperceptible' in respect of terminology used herein.

Significance of the Impact: Slight Imperceptible

Rationale for Impact Evaluation:

The modest extent of construction activities, focused on somewhat dispersed turbine locations as well as the transient nature of such activity (moving between turbine locations at various times)
The temporary – short-term duration of construction activity and the reversibility of effects once temporary construction areas and compounds are cleared and restored.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 17.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Forestry /Agriculture

Impact Magnitude:
Forestry harvesting operations are periodic, of a modest scale and are a typical activity of the Slievefelim to Silvermines Mountains upland area. Such operations also consist of frequent movement of HGV logging trucks along local and regional roads.

Significance of the Impact: Slight Imperceptible

Rationale for Impact Evaluation:

The modest scale, familiar form and temporary nature of forest harvesting activities.

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Evaluation of Other Cumulative Impacts – Intensification of activity causing a reduction in rural tranquillity

Whole UWF Project Effect

Cumulative Impact Magnitude:

UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm works areas occur across three Landscape areas; LCA-12, LCA-18 and LCA-17, and three of these Elements overlap in the Knocknabansha, Knockmaroe and Knockcurraghbola area, in LCA-17. However the developer has committed to undertake the works for the UWF Grid Connection, UWF Related Works and the Upperchurch Windfarm separately to avoid cumulative impacts to local residents, and therefore there will be NO combined construction activity occurring over the same time period. The duration of the effect will be longer in this area, but does not increase the cumulative magnitude, which remains negligible. There will be no cumulative effects from construction activities relating to other discrete sections of the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm works.

Due to the very low intensity of planting activities associated with UWF Replacement Forestry, this Element will not cause cumulative impacts with the Other Elements of the Whole UWF Project.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 17-4, the negligible magnitude combined with the medium to high sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18
- The separate construction / restoration periods for the UWF Grid Connection, UWF Related Works and the Upperchurch Windfarm, in the Knockmaroe and Knockcurraghbola area and the very small scale in the context of the extensive size and medium sensitivity of landscape character area LCA-17
- The modest scale and extent of construction activities with somewhat transient working areas dispersed across a relatively broad area of undulating topography (albeit with some common compound and welfare facilities for Upperchurch Windfarm and the UWF Related Works)
- The temporary – short-term duration of construction activity and the reversibility of effects once temporary construction areas and compounds are cleared and restored.

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

Cumulative Impact Magnitude:

During construction, Elements of the Whole UWF Project (in particular Upperchurch Windfarm and to a lesser extent UWF Related Works) could potentially be constructed during the same time as potentially periodic forest harvesting operations, and these activities cumulatively are likely to result in an overall intensity of construction related activity that is slightly greater than for the Whole UWF Project in its own right. However, working areas tend to be relatively discrete from each other and not generally intervisible.

Forestry harvesting could also increase HGV traffic along local and regional roads, which along with Whole UWF Project HGV traffic and roadworks associated with UWF Grid Connection (110kV UGC) and Haul Route Works (UWF Related Works) and road related activities for UWF Other Activities (Haul Route Activities) is likely to have a Low-negligible in-combination effect due to the increased frequency and intensity of HGV traffic within this relatively tranquil rural area.

Due to the very low intensity of planting activities associated with UWF Replacement Forestry, this Element will not cause cumulative impacts with Other Projects or Activities.

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Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- As per Table 17-4, the Low-negligible magnitude of cumulative effect combined with the medium to high sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18

- The small scale and extent of construction works in forestry landholdings
- The temporary – short-term duration of in-combination construction activity and the reversibility of effects once construction works are completed.

Note: No cumulative evaluation of Other Projects or Activities (Milestone Windfarm, Foilnaman Mast, Cummermore Communications Pole) is included in the table above, because these Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 17.2.2.2.1).

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17.2.4.3 Impact Evaluation Table: Intensification of built development and reduction in the integrity of rural landscape patterns

Impact Description	
Project Life Cycle Stage:	Operational stage

Impact Source: Presence of above ground structures, permanent alterations to landform/ vegetation patterns
Cumulative Impact Source: Presence of above ground structures, permanent alterations to landform/ vegetation patterns
Impact Pathway: visibility

Impact Description: There will be an increase in the amount of above-ground built development within the rural landscape of the study area once construction of the Whole UWF Project is complete. There will also be very minor permanent/ long-term changes to land cover and vegetation patterns. These structures / above ground expressions of the Whole UWF Project will add to the intensity of development and alteration of existing landscape patterns within a rural area where low levels of built development currently occur and there is a strong degree of uniformity and integrity of typical rural landscape features and patterns.
Impact Quality: Negative

Evaluation of the Subject Development Impact – Intensification of built development and reduction in the integrity of rural landscape patterns

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Absence of surface expression and land cover changes following reinstatement of construction works relating to the Internal Windfarm Cabling and Haul Route Works areas. Some land cover changes (0.22ha) from forestry or agricultural grassland to Realigned Windfarm Roads. The Telecoms Relay Pole is a modest and typical rural feature, structurally similar to single wooden electricity poles and will have a Neutral effect on landscape character.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 17-4, the negligible magnitude combined with the medium sensitivity of LCA-17
- compliance with the 'wise use and best choice' objective to maintain and enhance established patterns for LCA-17
- The barely discernable above ground expression and permanent changes to land cover resulting from the UWF Related Works.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude:
UWF Related Works cumulative impacts only relate to the inter-visibility of the Telecoms Relay Pole and the UWF Replacement Forestry, Consented UWF Turbines, and the existing Milestone turbines, Foilnaman Mast and Cummermore Communications Pole. It is considered that due to the common and typical nature of the UWF Replacement Forestry and the similarity to common single wooden electricity poles in the area, that neither there will be no cumulative effects between UWF Related Works and UWF Replacement Forestry. In relation to cumulative effects with Consented UWF Turbines, the Telecoms Relay Pole will not contribute to cumulative landscape character effects as the Telecoms Relay Pole is unlikely to be noticeable when viewed in combination with the turbines and met masts. Thus, the magnitude of the cumulative impact is deemed to be negligible.

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Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 17-4, the Negligible magnitude of cumulative effect combined with the medium to high

sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18

- Very minor, albeit long term / permanent, imperceptible impacts of UWF Related Works, such that they will not noticeably contribute to cumulative impacts in-combination with the Upperchurch Windfarm or with UWF Replacement Forestry.

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

Element 1: UWF Grid Connection

Impact Magnitude:
The above ground structures associated with the UWF Grid Connection are limited to the Mountphilips Substation. This new substation will have a minor, but permanent impact on the rural landscape fabric of its site and immediate surrounds. However, it is not readily visible from surrounding roads and residences, which limits the perceived impacts on landscape character, overall the impact magnitude of the Mountphilips Substation will be Low-negligible.
The 110kV UGC will be underground, predominately located under the public road, with surface expression in the form of periodic joint bay covers, which will not be noticeable in the context of the location of joint bays within road structures. 2.1ha of grassland will change land cover to stone access road (0.7ha) and substation compound/end mast footprint (1.4ha), however these uses are a typical type of rural landscape feature that will have an imperceptible effect on landscape character. Overall the impact of the 110kV UGC and UWF Grid Connection Access Road is considered to have a negligible magnitude of impact.

Significance of the Impact: Slight to Imperceptible

Rationale for Impact Evaluation:

As per Table 17-4, the Low negligible magnitude combined with the medium to high sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18
compliance with the 'control' of unavoidable new development objective for LCA-12 and the 'wise use and best choice' objective to maintain and enhance established patterns for LCA-17 and LCA-18
The visual containment of Mountphilips substation,
the barely discernable permanent surface expression of the 110kV UGC and typical nature of access roads.

Element 3: UWF Replacement Forestry

Impact Magnitude:
6ha of land cover change from one of the main characteristic land cover patterns contained within this upland rural area (agricultural grassland) to another (forestry).

Significance of the Impact: Neutral

Rationale for Impact Evaluation: The exchange of a small section of one characteristic form of land cover in this upland rural area to another

Element 4: Consented Upperchurch Windfarm

Impact Magnitude:
As per the ABP Inspectors Report (2014, Section 2), "In overall terms the principle of locating windfarm development in the area which is the subject of this appeal is reasonable". The LVIA for the Upperchurch Windfarm, which was considered by the inspector, found the impact on landscape character to be of a Low magnitude. The overall significance of landscape impact was deemed to be 'Low negligible' - equivalent of 'Slight-imperceptible' in respect of terminology used herein.

Significance of the Impact: Slight Imperceptible

Rationale for Impact Evaluation:

The rationale provided in the Upperchurch Windfarm LVIA and ABP Inspectors Report (2014, Section 9.55) "the undulating and rolling nature of the landscape coupled with the diverse vegetation does provide for a level of absorption capacity for the nature and scale of the proposed development. Therefore accepting

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that the development will impact visually on the area it will not be to a significant degree, I consider, to adversely impact on the area"

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 17.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Milestone Windfarm

Impact Magnitude:
Milestone Windfarm is a 4-turbine windfarm which comprises two planning permissions, the first for 5 turbines (of which 3 were constructed) at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry, and the second for 2 turbines (of which 1 was granted planning permission and constructed) in Knockduff and Inchivara. The locality of the Milestone Windfarm was assessed by the planning authority to have a 'Medium' impact.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

The rationale provided in the Milestone Windfarm Planners Report (Tipperary County Council Ref: 12510385, 28th November 2013) – '*I consider furthermore that the visual impact in the context of the local and regional topography is acceptable'*
The rationale provided in the Inchivara Windfarm ABP Inspectors report (ABP Ref: PL92.243611, page 19) – "I would consider that having regard to the permitted wind farms and the landscape designations applicable to the site that the proposed two turbines would not adversely impact on the visual amenities or the landscape character of the area. I would also consider that the proposed development would not adversely impact on the established residential amenities in the area from a visual perspective".

Other Project: Foilnaman Mast

Impact Magnitude:
The Mountphilips Substation will not be intervisible with the Foilnaman Mast, which is very small scale and typical structures that do not noticeably detract from the integrity of landscape character in their own right. Thus, the magnitude of the cumulative impact is deemed to be negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation: As per Table 17-4, the Negligible magnitude of cumulative effect combined with the medium to high sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18

Other Project: Cummermore Communications Pole

Impact Magnitude:
The Mountphilips Substation will not be intervisible with the Cummermore Comms. Pole, which is very small scale and typical structures that do not noticeably detract from the integrity of landscape character in their own right. Thus, the magnitude of the cumulative impact is deemed to be negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

As per Table 17-4, the Negligible magnitude of cumulative effect combined with the medium to high sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18.

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Evaluation of Other Cumulative Impacts – Intensification of built development and reduction in the integrity of rural landscape patterns

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:
Above ground structures will be built in Mountphilips townland (UWF Grid Connection) near Newport on the

eastern side of the Slievefelim to Silvermines Mountain Upland area, and in the Upperchurch area (UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm) on the eastern side of the upland area.

The Mountphilips Substation will not be visible with the Telecoms Relay Pole, the UWF Replacement Forestry or the Upperchurch Windfarm elements.

Any cumulative impacts only relate to the inter-visibility of the Telecoms Relay Pole and the UWF Replacement Forestry and the Upperchurch Windfarm. It is considered that due to the common and typical nature of the UWF Replacement Forestry and the similarity to common single wooden electricity poles in the area, that neither the UWF Replacement Forestry nor the Telecoms Relay Pole will contribute to cumulative landscape character effects with the Upperchurch Windfarm, as these elements (Telecoms Relay Pole and UWF Replacement Forestry) are unlikely to be noticeable when viewed in combination with the turbines and met masts. Thus, the magnitude of the cumulative impact is deemed to be negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 17-4, the Negligible magnitude of cumulative effect combined with the medium to high sensitivity of LCA-12 and the medium sensitivity of LCA-17 and LCA-18
- Very minor, albeit long term / permanent, imperceptible impacts of the UWF Grid Connection and UWF Related Works, such that they will not cumulatively cause noticeable impacts with the Upperchurch Windfarm.

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

Cumulative Impact Magnitude:
The Mountphilips Substation element of the UWF Grid Connection is not located close to any of the Other Projects or Activities, therefore there is no potential for the UWF Grid Connection to cause cumulatively impacts to Landscape Character with Other Projects or Activities.

The Telecom Relay Pole aspect of the UWF Related Works will contribute in a barely perceptible way to the intensity of built development (structures) in combination with Milestone Windfarm and the Foilnaman Mast or Cummermore Comms. Pole.

A 'Medium' (moderate) cumulative impact was previously assessed in the 2013 RFI for Upperchurch Windfarm, in respect of the Consented Upperchurch Windfarm and Milestone Windfarm and ABP considered the same cumulative impacts not to be significantly adverse.

Significance of the Cumulative Impact: Not Significant

Rationale for Cumulative Impact Evaluation:

The very minor and localised contribution to cumulative impact arising from the Not be Telecom Relay Pole in conjunction with Milestone Windfarm (and the Upperchurch Windfarm), which will be long-term and reversible.
The rationale provided in the Upperchurch Windfarm LVIA and 2014 ABP Inspectors Report (Section 9.5.5) "I also consider that, cumulatively when considered with existing and permitted wind energy developments the development will change the visual character of the area, but in overall terms it will not be to a significant degree as to be considered to adversely impact on the area."

Note: No cumulative evaluation of Other Projects or Activities (Forestry and Agricultural Activities) is included in the table above, because these Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 17.2.2.2.1).

17.2.4.4 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 17-13 below.

Table 17-13: Description and Rationale for Excluded Impacts to Landscape Character

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)
Operational Stage				
Operational Activities	1, 2, 3, 4	Visibility	Intensification of activity causing a reduction in rural tranquillity	Rationale for Excluding: Maintenance activities will range from annual testing of the UWF Grid Connection, twice yearly maintenance on the UWF Replacement Forestry lands, to monthly inspection of UWF Related Works, to weekly maintenance of the Upperchurch Windfarm. All of these activities will take place from hard-core areas, with the vast majority of activity taking place on the turbine hardstands. Therefore, operational activities will have a Neutral effect on landscape character.
Decommissioning Stage				
Rationale for Excluding: No potential for impacts/ Neutral effects due to: Neither the UWF Grid Connection nor the UWF Replacement Forestry will be decommissioned/harvested. In relation to the UWF Related Works and Upperchurch Windfarm, decommissioning works will involve very minor temporary works resulting in no change or improved landscape condition and visual amenity due to the removal of structures and windfarm associated development. This will not result in any negative impact on landscape character.				

17.2.5 Mitigation Measures for Impacts to Landscape Character

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 Landscape Character as a consequence of the UWF Related Works.

17.2.6 Evaluation of Residual Impacts to Landscape Character

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 Landscape Character above (Section 17.2.4) – i.e. **no significant adverse impacts**.

17.2.7 Application of Best Practice and the EMP for Landscape Character

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 **Landscape Character,** 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-18	Best practice for the protection and preservation of tree roots during the construction phase
RW-BPM-28	Minimising Disturbance and Damage to Land

These Best Practice Measures primarily relate to Biodiversity (RW-BPM-17 and RW-BPM-18), and to Land (RW-BPM-28), they are included in full at the end of Chapter 8: Biodiversity and Chapter 9: Land, respectively. These Best Practice Measures also form part of the UWF Related Works Environmental Management Plan, which is included as Volume D with the planning application.

17.2.8 Summary of Impacts to Landscape Character

A summary of the Impact to Landscape Character is presented in Table 17-14.

Table 17-14: Summary of the impacts to Landscape Character

Impact to Landscape Character:	**Alteration or division of land cover and vegetation patterns**	**Intensification of activity causing a reduction in rural tranquillity**	**Intensification of built development and reduction in the integrity of rural landscape patterns**
Evaluation Impact Table	*Section 17.2.4.1*	*Section 17.2.4.2*	*Section 17.2.4.3*
Project Life-Cycle Stage	*Construction*	*Construction*	*Operation*
UWF Related Works *Direct/indirect Impact*	**Imperceptible**	**Imperceptible**	**Imperceptible**
UWF Related Works *Cumulative Impact*	**Slight**	**Imperceptible**	**Imperceptible**
Element 1: UWF Grid Connection	Imperceptible	Slight to Imperceptible	Slight to Imperceptible
Element 3: UWF Replacement Forestry	Imperceptible	Imperceptible	Neutral
Element 4: Upperchurch Windfarm	Slight to Imperceptible	Slight to Imperceptible	Slight to Imperceptible
Element 5: UWF Other Activities	Neutral Impacts/No Impacts - Evaluated as Excluded, see Section 17.2.2.2.1		
Other Cumulative Impacts:			
Whole UWF Project Effect	Slight	Imperceptible	Imperceptible
Whole UWF Project *cumulatively with* Other Projects or Activities Milestone Windfarm Foilnaman Mast Cummermore Communications Pole Forestry activities Agricultural activities	Slight to Imperceptible	Slight	Not Significant

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.

17.3 Sensitive Aspect No.2: Visual Amenity

This Section provides a description and evaluation of the Sensitive Aspect - Visual Amenity.

The visual amenity of a range of population-based receptor types, which are located within the UWF Related Works Study Area and/or within the Cumulative Evaluation Study Area and are relevant to this appraisal include; designated scenic views; local community views; and views from centres of population; major routes; heritage and amenity features.

17.3.1 BASELINE CHARACTERISTICS of Visual Amenity

17.3.1.1 STUDY AREA for Visual Amenity

The study area for Visual Amenity in relation to the UWF Related Works is described in Table 17-15 and illustrated on Figure RW 17.3: Visual Amenity within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 17-15: UWF Related Works Study Area for Visual Amenity

Study Area for Visual Amenity	Justification for the Study Area Extents
500m corridor from construction works areas 2km radius from Telecom Relay Pole	Distances outside of which, each aspect of the development could not materially affect prevailing visual amenity

17.3.1.2 Baseline Context and Character of Visual Amenity in the UWF Related Works Study Area

Visual amenity receptors within the study area for the UWF Related Works includes the two designated scenic routes; **V57 and V58**; the R503 and R497 regional roads, views from local residences which are located along public roads, and views from the settlement of Upperchurch village, while the main amenity and heritage assets are way-marked walking trails – the Ormond Way walking route, the Ormond Way cycle route and the Eamonn a Chnoic Loop.

Views from all visual receptor types take in typical upland rural scenes of undulating farmland and forestry and occasional peaks of higher mountains passing through the Silvermines range. Views from upper slopes and ridges such as those afforded from walking tracks can be extensive, but most other receptors in the base of valleys (roads and settlements) are afforded more enclosed views.

17.3.1.3 Importance of Visual Amenity

The value of the views on offer from all of these receptor types relates to the pleasant rural setting with strong landscape integrity rather than a strong sense of the naturalistic or the provision of vast, panoramas. Rural visual amenity is an integral and important aspect of the lifestyle of the local community who live and work in areas such as this. This visual amenity also extends to the greater number of major route users that pass through the Slievefelim to Silvermine Mountains upland area, which are also designated scenic routes in this instance. The various walking trails within this upland area provide a recreational amenity for local residents as well as a tourism amenity for visitors to the area.

17.3.1.4 Sensitivity of Visual Amenity

The key visual amenity sensitivity for the relevant receptors is the permanent obstruction (blocking) of open views and/or permanent visual change in the form of new or unfamiliar landscape elements that detract from scenic and rural amenity. All of the relevant receptor types are identified in the first column of Table 17.5 as being amongst the 'most susceptible' to visual change. However, in accordance with GLVIA

2013 'susceptibility' must be balanced against the 'value' of the views on offer in order to determine overall sensitivity and in this case visual amenity relates to fairly typical upland and lowland rural views. On balance, visual sensitivity is considered to be **Medium**.

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

In recent years, the key contributor to visual change is the emergence of wind energy developments on upper slopes and ridges within the south and southeast of the Slievefelim to Silvermine Mountain upland area, which can be seen intermittently in the distance from all of these receptor types. With the construction of nearer currently permitted wind farms including Upperchurch, Milestone (currently under construction) and Bunkimalta, wind energy development is likely to be more prominent and more frequent within views. First rotation forestry compartments are also beginning to be harvested resulting in temporary visual impacts from harvesting operations and short to medium term loss of forest vegetation.

17.3.1.6 Receiving Environment (the Baseline + Trends)

The identified trends are occurring gradually and in a predictable and consistent manner, so it is assumed in this report that the receiving landscape is the same as the baseline environment identified above.

17.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

17.3.2.1 Cumulative Evaluation Study Areas

17.3.2.1.1 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 Visual Amenity	Justification for the Study Area Extents
Cumulative construction effects: 1km corridor from UWF Related Works construction works areas Cumulative operational effects; 4km radius from Telecoms Relay Pole	Distances outside of which, the construction works or Telecoms Relay Pole could not have a material cumulative effect on prevailing landscape character or visual amenity – i.e. any effects beyond 500m from construction works or 2km from the Telecom Relay Pole will be Neutral due to the increased likelihood of screening by intervening landform and vegetation or the combined ameliorating factors of diminishing 'scale in relation to distance' and 'visual absorption' into the overall landscape setting.

The study is illustrated on **Figure CE 17.3: Visual Amenity within the UWF Related Works Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

17.3.2.1.2 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.

The 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 17-16 and illustrated on Figure WP 17.3: Visual Amenity within the Whole Project Cumulative Evaluation Study Area.

Table 17-16: Whole Project Cumulative Evaluation Study Area for Visual Amenity

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	500m corridor from works areas and activity locations 2km radius from above ground level structures Cumulative construction effects: 1km corridor from Whole UWF Project Elements works areas and activity locations Cumulative operational effects; 4km radius from Mountphilips Substation, Telecoms Relay Pole, UWF Replacement Forestry	Distances outside of which, the Mountphilips Substation, Telecoms Relay Pole, UWF Replacement Forestry could not have a material cumulative effect on prevailing landscape character or visual amenity– i.e. any effects beyond 2km from the aforementioned elements will be Neutral. Any cumulative landscape character and visual amenity impacts beyond these study areas will only relate to the presence of cumulative turbines in views containing the consented UWF turbines, the cumulative impacts of
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
		which have previously been assessed as acceptable by ABP.

17.3.2.2 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Visual Amenity considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6, in Volume C4 EIAR Appendices. Scoping of these Other Elements is presented in Section 17.3.2.2.1 below.

The evaluation of cumulative impacts to Visual Amenity 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 Visual Amenity 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 A2.3.17).

The results of this scoping exercise are that: Milestone Windfarm, Foilnaman Mast, Cummermore Communications Pole and the activities of Forestry and Agriculture have been scoped in for evaluation of cumulative effects to Visual Amenity.

17.3.2.2.1 Potential for Impacts to Visual Amenity

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 Visual Amenity. The results of this evaluation are included in Table 17-17.

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 17.3. The baseline character of the areas around these projects is described in Section 17.3.2.3.

Table 17-17: 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	Evaluated as excluded: Neutral effects due to: • Upperchurch Hen Harrier Scheme: Once off activities will take place during the construction stage, and comprise planting and fencing at hedgerows, water-course boundaries and areas of scrub. These activities will not generate any adverse effects to visual amenity. • Haul Route Activities: It is considered that there will be Neutral effects to visual amenity, as there will be no disturbance of land cover, and any tree trimming will be in the context of road boundary tree trimming that regularly takes place along the public road network, and the presence of any machinery in the context of busy regional and national roads. • Overhead Line Activities do not require any works to land and any brief visibility of such minor works will have no effect on visual amenity.

	• Monitoring Activities do not require any works to land, no effects to visual amenity are expected from brief periods of very minor activity.
Other Projects or Activities	
Milestone Windfarm	Yes, included for the evaluation of cumulative effects,
Foilnaman Mast Cummermore Communications Pole	Yes, included for the evaluation of cumulative operational stage effects, Excluded from evaluation in relation to cumulative construction stage effects as the Foilnaman Mast and Cummermore Communications Pole already exist and are considered part of the baseline.
Forestry activities Agricultural activities	Yes, included for the evaluation of cumulative construction stage effects, Excluded from evaluation in relation to cumulative operational stage effects as these activities are the prevailing and characteristic land uses in this area, i.e. they are the baseline rather than other sources of impact.

17.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

The visual amenity of a range of population-based receptor types, which are located within the within the Cumulative Evaluation Study Area and are relevant to this appraisal include; designated scenic views; local community views; and views from centres of population; major routes; heritage and amenity features

Views from all visual receptor types take in typical upland rural scenes of undulating farmland and forestry and occasional peaks of higher mountains passing through the Silvermines range. Views from upper slopes and ridges such as those afforded from walking tracks can be extensive, but most other receptors in the base of valleys (roads and settlements) are afforded more enclosed views. Views of the gently rolling lowland landscape of fields and hedgerows at the western end of the Cumulative Evaluation Study Area are only relevant to local community receptors. These views have a something of a traditional 'pastoral' aesthetic and tend to be relatively contained by landform and vegetation.

17.3.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred 110kV UGC route Jan'19*

There are two designated scenic routes which also coincide with the only two major routes in the area; these are identified in Appendix 4 of the North Tipperary County Development Plan as; **V57** – 'Views north and south on sections of the R503 from Newport to Ballycahill, and; **V58** – 'Views east and west of the R497 from the R503 through the mountains to Dolla - including Mother Mountain to the West, Knockacreggan to the East, Coneen Hill to the East and the Silvermines to the west'. The 110kV UGC will be located along the V57 scenic route for 17.7km, on the R503 between Newport and the L2264-50 junction in Knocknabansha.

Local community views include views from local residences which are located along public roads throughout the study area. Settlements relevant to the UWF Grid Connection includes the villages of Rear Cross and the town of Newport, while the main, amenity and heritage assets within the UWF Grid Connection study area are way-marked walking and cycle trails- the Slieve Felim Way and the Ormond Way cycle route. These routes are delineated on Figure WP 17-3.

UWF Grid Connection project overlaps with the UWF Related Works along the R503 at Knocknabansha and along the L2265-50 and L6166-0 local roads in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons where the 110kV UGC is located in the same public roads that are associated with UWF Related Works Haul Route Works and with 2 crossing points for Internal Windfarm Cabling.

17.3.2.3.2 Element 3: UWF Replacement Forestry

Visual amenity receptors within the study area for the UWF Replacement Forestry includes local residences which are located along public roads, and views from the Ormond Way cycle route The UWF Replacement Forestry will not be visible from designated scenic routes, major routes or from settlements..

17.3.2.3.3 Element 4: Already Consented Upperchurch Windfarm

The UWF Related Works and UWF Replacement Forestry are located in the near vicinity of the UWF, and many of the visual amenity receptors identified above for these Elements will view the UWF Related Works and the UWF Replacement Forestry in conjunction with the already consented Upperchurch Windfarm.

Consideration of the Passage of Time: With the exception of the Milestone Windfarm, which is now operational, there has been no material change in visual amenity in the Upperchurch Windfarm area. It should be noted that Milestone Windfarm was considered cumulatively in the 2013/2014 planning assessments, and therefore the descriptions in the 2013 and 2014 documents remain relevant to the cumulative evaluations in this Revised EIAR.

17.3.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 17.3.2.2.1

17.3.2.3.5 Other Projects or Activities

Milestone Windfarm, comprises of 4 turbines constructed on lands adjacent to the Upperchurch Windfarm, and across a valley from the Telecom Relay Pole. The existing **Foilnaman Mast** is located on the same hill as the Telecom Relay Pole (UWF Related Works). **Cummermore Communications Pole** is located c.2km to the southwest of the Upperchurch Windfarm. **Agriculture and forestry** occur throughout the upland study area.

17.3.3 PROJECT DESIGN MEASURES for Visual Amenity

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 17-18 are relevant to the Environmental Factor, Landscape, and in particular to the sensitive aspect **Visual Amenity**.

Table 17-18: UWF Related Works Project Design Measures relevant to Visual Amenity

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.

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 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.

Visual Amenity

Sensitive Aspect

17.3.4 EVALUATION OF IMPACTS to Visual Amenity

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) - Visual Amenity.

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

Table 17-19: 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)*
Intensification of activity causing visual disharmony, clutter or complexity (construction stage)	*Intensification of activity causing visual disharmony, clutter or complexity (operational stage)*
Addition of new features or loss of existing features causing visual disharmony, clutter or complexity (operational stage)	*Decommissioning Effects*

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables, which are presented in the following **Sections 17.3.4.1 to 17.3.4.2.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Tables, in Section 17.3.4.3.

Topic

Landscape

17.3.4.1 Impact Evaluation Table: Intensification of activity causing visual disharmony, clutter or complexity

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction related activities
Cumulative Impact Source: Construction related activities, forestry harvesting
Impact Pathway: Visibility

Impact Description: Construction activity will include the near constant movement, during daylight hours, of machinery, vehicles and people to and from both linear and fixed working areas and, to a lesser effect, to and from construction compounds. Temporary fencing and welfare facilities will be erected and there will be temporary stockpiling of excavated materials and construction materials. This intensity of construction activity is not a typical component of views in this upland rural area.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Intensification of activity causing visual disharmony, clutter or complexity

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Construction activities will involve single 3-4 man crews working linearly at Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works locations and at the Telecoms Relay Pole site. Works will be minimal and will not be noticeable in the context of the windfarm construction works which will be carried out at the same time. Parts of the UWF Related Works will be visible from the V57 designated scenic route which is routed on the Regional Road R503, a small number of local residences and from sections of the Eamonn a Chnoic (4.2km within 500m), Ormond Way walking trail (5.4km within 500m) and the Ormond Cycle route (4.5km within 500m).
It is considered that the magnitude of visual clutter, disharmony and complexity will be **negligible** due to the small scale and somewhat transient nature of the construction activities within a relatively broad site area that will disperse the intensity of construction activity, even if it is all occurring at once.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

As per Table 17-3, the **negligible** magnitude combined with the **medium sensitivity** of visual receptors within the study area
The very small scale, transient and dispersed nature of construction activity for these project elements.
The temporary duration of construction activities and
the reversibility of effects once temporary construction areas are cleared and restored.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: Upperchurch Windfarm, for the most part, has greatest potential to cause cumulative effects with UWF Related Works, due to the proximity of the two projects to each other and the expected overlap of construction work periods. The magnitude of cumulative impacts is reduced by the colocation of c.62% of Internal Windfarm Cabling in Upperchurch Windfarm roads, these works will be carried out by Upperchurch Windfarm crews and will not cause any noticeable increase in visual disharmony, clutter or complexity. In addition, UWF Related Works will only alter small and independent sections of land cover and vegetation that will be temporarily disrupted and restored independently, thereby avoiding noticeable cumulative effects.

Visual Amenity

Sensitive Aspect

Cumulative impacts of UWF Related Works and UWF Grid Connection works will be confined to the public road where the UWF Grid Connection will not cause any additional stockpiling or fencing of lands.

Planting works associated with UWF Replacement Forestry will be carried in the general vicinity of some UWF Related Works and Upperchurch Windfarm construction works locations, however the planting works will have a negligible magnitude of activity, and no use of large machinery.

Forestry operations are not likely to cause noticeable cumulative effects due the very small extent of UWF Related Works on forestry lands.

The overall magnitude of cumulative impact is therefore deemed to be Low-negligible.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- As per Table 17-3, the low negligible magnitude combined with the medium sensitivity of visual receptors within the study area
- The very small extent and scale of additional works and personnel required for UWF Related Works
- The overlap of UWF Related Works on Consented UWF Roads;
- the predominantly temporary duration and the reversibility of the impact with the completion of construction works.
- The small extent of works for UWF Grid Connection in the UWF Related Works Cumulative Evaluation Study Area;
- The very low intensity of planting activities associated with the UWF Replacement Forestry

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

Element 1: UWF Grid Connection

Impact Magnitude:
The greatest intensity and duration of construction related activity for the UWF Grid Connection will occur within and around the Mountphilips Substation site. The Mountphilips substation site is well contained by existing terrain and vegetation, which will restrict the extent to which construction activity can affect visual amenity. The Mountphilips Substation works and new access road/entrance works will be partially visible from a handful of local residences (See Appendix 17.1, Section A-17.1.2) and will not be visible from any other sensitive visual receptors.
At the remaining UWF Grid Connection works, where the 110kV UGC will be constructed within the public road network, construction activity will be largely transient in nature (moving through the landscape) with work areas coming into use and then becoming redundant. While some sections of these works areas will be more visually exposed, than the new substation, the intensity and duration of the works will be much lower. The remaining UWF Grid Connection works be intermittently visible from a number of receptors, mainly local community views from local residences that are located along the local public road network, and from the designated scenic routes comprising the Regional Roads the V57 scenic route between Newport and Knocknabansha, and one section of the V58 scenic route on the R503 and R497 at Knocknabansha. Walkers on the Slievefelim Way could encounter works where the walk crosses the R503 at Rearcross, while the Ormond Way cycle route crosses the 110kV UGC at one point in the Knockcurraghbola area.

Due to the degree of visual containment of the Mountphilips Substation site and the temporary duration of construction activities along the public road network, it is considered that any visual disharmony, clutter or complexity caused by the construction works associated with the UWF Grid Connection will have a Low negligible impact magnitude.

Landscape

Topic

Significance of the Impact: Slight Imperceptible

Rationale for Impact Evaluation:

- As per Table 17-3, the Low negligible magnitude combined with the Medium sensitivity of visual receptors within the study area

- visual containment of Mountphilips Substation works transient nature of the 110kV UGC trenching works
- The temporary duration of construction activities and
- the reversibility of effects once construction works are completed, and road reinstatement/land reinstatement works are complete.

Element 3: UWF Replacement Forestry

Impact Magnitude:
Very low intensity planting activities involving the delivery and temporary storage of seedlings prior to hand planting by a small team of workers over a short time period will cause negligible visual disharmony, clutter or complexity.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

As per Table 17-3, the negligible magnitude combined with the medium sensitivity of visual receptors within the study area
The very small extent and intensity of planting activities that will not conflict with typical rural activities in this landscape, which include forest planting
The temporary duration (1 month) of planting activities

Element 4: Consented Upperchurch Windfarm

Impact Magnitude:
The Upperchurch Wind Farm LVIA (2013) evaluated visual impact magnitude at 21 no. viewpoints and this ranged between high and low depending on proximity and visual exposure. In reviewing this LVIA as part of his own assessment, the ABP Inspector concluded (2014 report, Section 9.55) *"the undulating and rolling nature of the landscape coupled with the diverse vegetation does provide for a level of absorption capacity for the nature and scale of the proposed development. Therefore accepting that the development will impact visually on the area it will not be to a significant degree, I consider, to adversely impact on the area*".

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

The rationale provided in the ABP Inspectors Report (2014, Section 9.55) – reproduced in Impact Magnitude box above)
The temporary / short term duration of construction related activities

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 17.3.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Milestone Windfarm

Impact Magnitude:
Milestone Windfarm is a 4-turbine windfarm which comprises two planning permissions, the first for 5 turbines (of which 3 were constructed) at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry, and the second for 2 turbines (of which 1 was granted planning permission and constructed) in Knockduff and Inchivara. The locality of the Milestone Windfarm was assessed by the planning authority to have a 'Medium' sensitivity.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The rationale provided in the Milestone Windfarm Planners Report (Tipperary County Council Ref: 12510385, 28th November 2013) – '*I consider furthermore that the visual impact in the context of the local and regional*

topography is acceptable'

- The rationale provided in the Inchivara Windfarm ABP Inspectors report (ABP Ref: PL92.243611, page 19) – *"I would consider that having regard to the permitted wind farms and the landscape designations applicable to the site that the proposed two turbines would not adversely impact on the visual amenities or the landscape character of the area. I would also consider that the proposed development would not adversely impact on the established residential amenities in the area from a visual perspective".*

Other Project: Forestry /Agriculture

Impact Magnitude:
Agriculture and forestry are the prevailing land uses in the area. Forest harvesting operations are periodic, of a modest scale and are a typical activity of the Slievefelim to Silvermines Mountains upland area. Forestry harvesting operations also consist of periodic frequent movement of HGV logging trucks along local and regional roads.

Significance of the Impact: No impact

Rationale for Impact Evaluation:

These are the prevailing and characteristic land uses in this area (they are the baseline rather than other sources of impact)

Evaluation of Other Cumulative Impacts – Intensification of activity causing visual disharmony, clutter or complexity

Whole UWF Project Effect

Cumulative Impact Magnitude:
UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm works areas will occur across a wide (c.30 km) area, with construction of UWF Grid Connection, UWF Related Works and Upperchurch Windfarm overlapping in the Knocknabansha, Knockmaroe and Knockcurraghbola areas. However, the construction activity for these elements will not occur at the same time. Although this deliberate sequencing of construction works will result in a slightly longer construction period, the intensity of activity will be much less than if each of these elements was constructed at the same time.

There may be very minor cumulative effects from construction activities relating to other discrete aspects of the UWF Grid Connection and to the UWF Replacement Forestry where emerging turbines from the Upperchurch Windfarm are also visible in the distance in conjunction with more localised construction activity and planting works. Overall, the magnitude of impact is deemed to be **low-negligible**.

Significance of the Cumulative Impact: Slight to Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 17-3, the low negligible magnitude combined with the medium sensitivity of visual receptors within the study area
- The modest scale and extent of construction activities with somewhat transient working areas dispersed across a relatively broad area of undulating topography (albeit with common compound and welfare facilities)
- The very low intensity of planting activities associated with the UWF Replacement Forestry
- The temporary – short-term duration of construction activity and the reversibility of effects once temporary construction areas and compounds are cleared and restored.

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

Cumulative Impact Magnitude:
If the construction of the Whole UWF Project occurs at the same time as periodic forest harvesting operations, this would result in an overall intensity of activity that is slightly greater than for the Whole UWF Project in its

own right. However, working areas tend to be relatively discrete from each and not generally intervisible. HGV traffic along local and regional roads is likely to have a **Low** in-combination effect.

No above ground UWF Grid Connection structures inter-visible with the Milestone Windfarm.

Milestone Windfarm was previously assessed in the 2013 RFI for Upperchurch Windfarm, to have a 'Medium' (moderate) cumulative impact in conjunction with Upperchurch Windfarm and ABP considered the same cumulative impacts not to be significantly adverse.

Forestry harvesting could also increase HGV traffic along local and regional roads, which along with Whole UWF Project HGV traffic and roadworks associated with UWF Grid Connection (110kV UGC) and Haul Route Works (UWF Related Works) and road related activities for UWF Other Activities (Haul Route Activities) is likely to have a Low-negligible in-combination effect to visual amenity due to the increased frequency and intensity of HGV traffic within this relatively tranquil rural area.

Significance of the Cumulative Impact: Slight *(with Forestry),* Not Significant *(with Milestone)*

Rationale for Cumulative Impact Evaluation:

As per Table 17-3, the low magnitude combined with the medium sensitivity of visual receptors within the study area

The modest scale and extent of construction/forestry activities where hubs of intensive activity are dispersed and discrete from each other

The temporary – short-term duration of in-combination construction activity and the reversibility of effects once temporary construction areas and compounds are cleared and restored

- The rationale provided in the ABP Inspectors Report (2014, Section 9.5.5) - "I also consider that, cumulatively when considered with existing and permitted wind energy developments the development will change the visual character of the area, but in overall terms it will not be to a significant degree as to be considered to adversely impact on the area."

Note: No cumulative evaluation of Other Projects or Activities (Foilnaman Mast, Cummermore Communications Pole) is included in the table above, because these Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 17.3.2.2.1)

Visual Amenity
Sensitive Aspect
Landscape
Topic

Visual Amenity
Sensitive Aspect

17.3.4.2 Impact Evaluation Table: Addition of new features or loss of existing features causing visual disharmony, clutter or complexity

Impact Description	
Project Life Cycle Stage:	Operational stage

Impact Source: Presence of above ground structures, permanent alterations to landform/ vegetation patterns
Cumulative Impact Source: Construction related activities, forestry harvesting
Impact Pathway: Visibility

Impact Description: There will be an increase in the amount of above-ground built development within the rural landscape of the study area once construction of the Whole UWF Project is complete. There will also be very minor permanent/ long-term changes to land cover and vegetation. Partial enclosure of views in also likely to result from the UWF Replacement Forestry. These structures / above ground expressions of the Whole UWF Project will add to the intensity of development and alteration of existing landscape patterns within a rural area where low levels of built development currently occur and there is a strong degree of landscape uniformity and integrity within rural vistas.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Addition of new features or loss of existing features causing visual disharmony, clutter or complexity

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
No surface expression or land cover change following reinstatement of construction works relating to the Internal Windfarm Cabling, Haul Route Works and RW Ancillary Works. Barely discernible surface expression and land cover change (0.22ha) following reinstatement of construction works relating to the Realigned Windfarm Roads and the Telecoms Relay Pole which are also both modest and typical rural features that will have a very minor effect on the visual amenity from immediately surrounding local roads and several nearby dwellings. See Figure RW 17.4: Visibility of the Telecom Relay Pole from VP1 on the R503, and Figure RW 17.5 : Visibility of the Telecom Relay Pole from VP2 on the L-2264-50 Local Road , (also see visibility map at Appendix 17.1, Sections A-17.1.3). Though visible, the relay pole is the type of small scale, innocuous structure that is unlikely to be noticed by a casual observer or even by local residents a short period of time after it is initially erected. The Telecoms Relay Pole will not be visible / have any impact on visual amenity from any other types of receptor than local roads and residents and for these reasons the magnitude of impact is negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 17-3, the negligible magnitude combined with the medium sensitivity of visual receptors within the study area
- The barely discernable, permanent above-ground expression of all aspects of the UWF Related Works except the Telecoms Relay Pole.
- The barely noticeable, localised, long-term impact on visual amenity arising from the presence of the Telecoms Relay Pole.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude:
UWF Related Works cumulative impacts only relate to the Telecoms Relay Pole aspect of the UWF Related Works which will have a negligible visual impact in the form of visual clutter in-combination with either the Consented UWF Turbines or the operational Milestone Windfarm or existing Foilnaman or Cummermore

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masts, with effects only occuring from a very limited sections of the local road and several residences.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 17-3, **negligible** magnitude combined with the **medium sensitivity** of visual receptors within the study area;
- Small scale of the Telecom Relay Pole which is similar to common single wooden electricity poles in the area;
- The very minor and localised contribution to cumulative impact arising from the Telecom Relay Pole in conjunction with the Foilnaman and Cummermore Comms Poles and the Milestone Windfarm (and the Upperchurch Windfarm), which will be long-term and reversible.

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

Element 1: UWF Grid Connection

Impact Magnitude:
The Mountphilips Substation will have a very minor impact on visual amenity due to the fact that it is substantially screened from view. See Figure GC 17.4: Visibility of the Mountphilips Substation from VP1 on the L2166-0 in Coole townland, (also see visibility map at Appendix 17.1, Sections A-17.1.3). In conjunction with fieldwork investigation, these figures highlight the strong degree of both landform and vegetative screening that surrounds the Mountphilips Substation site. Indeed, the main permanent visible components will be the site entrance and the initial section of the access road along with the very top sections of the lattice towers amongst treetops at distances of around 500m. It is considered that the magnitude of visual impacts caused by the Mountphilips Substation will be of a negligible magnitude.
The 110kV UGC will be underground, predominately along the public road, and will have negligible effects on visual amenity, the sole surface expression of the 110kV UGC will be in the form of periodic link box man-hole type covers at Joint Bay locations. It is considered that the magnitude of visual impacts caused by the 110kV UGC will be negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

As per Table 17-3, the negligible magnitude combined with the medium sensitivity of visual receptors within the study area
The high level of screening around Mountphilips Substation,
the barely discernable permanent surface expression of the 110kV UGC.

Element 3: UWF Replacement Forestry

Impact Magnitude:
Small scale (6 hectares) visual change of a typical nature (farmland to woodland) in this upland rural area. Likely very localised partial enclosure of views from several residences and from the Ormond Way cycle route which is routed along the adjacent local road a short distance to the west and only when the new native woodland is reaching maturity.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

As per Table 17-3, the negligible magnitude combined with the medium sensitivity of visual receptors within the study area the small scale and typical nature of visual change
The very minor visual enclosure experienced by a few very localised receptors

Element 4: Consented Upperchurch Windfarm

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Impact Magnitude:
The Upperchurch Wind Farm LVIA evaluated visual impact magnitude 21 no. viewpoints and this ranged between high and low depending on proximity and visual exposure. In reviewing this LVIA as part of his own assessment, the ABP Inspector concluded (2014 report, Section 9.55) *"the undulating and rolling nature of the landscape coupled with the diverse vegetation does provide for a level of absorption capacity for the nature and scale of the proposed development. Therefore accepting that the development will impact visually on the area it will not be to a significant degree, I consider, to adversely impact on the area*".

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

The rationale provided in the Upperchurch Windfarm LVIA and ABP Inspectors Report (2014, Section 9.55) "the undulating and rolling nature of the landscape coupled with the diverse vegetation does provide for a level of absorption capacity for the nature and scale of the development. Therefore accepting that the development will impact visually on the area it will not be to a significant degree, I consider, to adversely impact on the area"

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 17.3.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Milestone Windfarm

Impact Magnitude:
Milestone Windfarm is a 4-turbine windfarm which comprises two planning permissions, the first for 5 turbines (of which 3 were constructed) at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry, and the second for 2 turbines (of which 1 was granted planning permission and constructed) in Knockduff and Inchivara. The locality of the Milestone Windfarm was assessed by the planning authority to have a 'Medium' sensitivity.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

The rationale provided in the Milestone Windfarm Planners Report (Tipperary County Council Ref: 12510385, 28th November 2013) – '*I consider furthermore that the visual impact in the context of the local and regional topography is acceptable'*
The rationale provided in the Inchivara Windfarm ABP Inspectors report (ABP Ref: PL92.243611, page 19) – "I would consider that having regard to the permitted wind farms and the landscape designations applicable to the site that the proposed two turbines would not adversely impact on the visual amenities or the landscape character of the area. I would also consider that the proposed development would not adversely impact on the established residential amenities in the area from a visual perspective"

Other Project: Foilnaman Mast

Impact Magnitude:
The existing Foilnaman mast is a modest scale telecommunications structure, which is unlikely to be noticed by casual observers and has a very minor impact on visual amenity in a relatively localised area

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

The small scale permanent impacts arising from the existing Foilnaman mast

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Other Project: Cummermore Communication Pole

Impact Magnitude:
The existing Cummermore Comms Pole is a modest scale telecommunications structure, which is unlikely to be noticed by casual observers and have a very minor impact on visual amenity in a relatively localised area

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

The small scale permanent impacts arising from the existing Cummermore Comms Pole

Evaluation of Other Cumulative Impacts – Addition of new features or loss of existing features causing visual disharmony, clutter or complexity

Whole UWF Project Effect

Cumulative Impact Magnitude:

Above ground structures will be built in Mountphilips townland (UWF Grid Connection) near Newport on the eastern side of the Slievefelim to Silvermines Mountain Upland area, and in the Upperchurch area (UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm) on the eastern side of the upland area.

UWF Grid Connection, UWF Related Works and Upperchurch Windfarm works areas overlap. Following reinstatement of construction works areas, other than the Upperchurch Windfarm, there will be very minor surface expression of Whole UWF Project elements in the overlapping study areas and only the Telecoms Relay Pole aspect of the UWF Related Works will have any potential to cause visual impact in the form of visual clutter in-combination with the Consented UWF Turbines and this will be a very minor effect and only from a very limited sections of the local road and several residences.

The UWF Replacement Forestry is also likely to be visible from very localised receptors in-combination with some of the Consented UWF Turbines. However the cumulative effect of this is likely to eventually be neutral as the new native woodland will eventually screen the turbines as it matures.

The cumulative magnitude of visual effects is considered to be **negligible.**

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

As per Table 17-3, **negligible** magnitude combined with the **medium sensitivity** of visual receptors within the study area

The very limited visible expression of the UWF Grid Connection, UWF Related Works or UWF Replacement Forestry in conjunction with the Upperchurch Windfarm

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

Cumulative Impact Magnitude:

The Telecoms Relay Pole aspect of the UWF Related Works will contribute in a barely perceptible way to the intensity of built development (structures) in combination with Milestone Windfarm and the Foilnaman and Cummermore Comms Poles.

The UWF Replacement Forestry will not have any discernible in-combination impact other than the potentially positive screening of structures over time.

Milestone Windfarm was previously assessed in the 2013 RFI for Upperchurch Windfarm, to have a 'Medium' (moderate) cumulative impact in conjunction with Upperchurch Windfarm and ABP considered the same cumulative impacts to be acceptable.

Significance of the Cumulative Impact: Not Significant

Rationale for Cumulative Impact Evaluation:

As per Table 17-3, **negligible** magnitude combined with the **medium sensitivity** of visual receptors within the study area

The very minor and localised contribution to cumulative impact arising from the Telecom Relay Pole in

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conjunction with the Foilnaman and Cummermore Comms Poles and the Milestone Windfarm (and the Upperchurch Windfarm), which will be long-term and reversible.

- The rationale provided in the ABP Inspectors Report (2014, Section 9.5.5) - "I also consider that, cumulatively when considered with existing and permitted wind energy developments the development will change the visual character of the area, but in overall terms it will not be to a significant degree as to be considered to adversely impact on the area."

Note: No cumulative evaluation of Other Projects or Activities (Forestry and Agricultural Activities) is included in the table above, because these Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 17.3.2.2.1).

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17.3.4.3 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 17-20 below.

Table 17-20: Description and Rationale for Excluded Impacts to Visual Amenity

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)
Operational Stage				
Operational Activities	1, 2, 3, 4	Visibility	Intensification of activity causing visual disharmony, clutter or complexity	Rationale for Excluding: Maintenance activities will range from annual testing of the UWF Grid Connection, twice yearly maintenance on the UWF Replacement Forestry lands, to monthly inspection of UWF Related Works, to weekly maintenance of the Upperchurch Windfarm. All of these activities will take place from hard-core areas, with the vast majority of activity taking place on the turbine hardstands. Therefore operational activities will have a Neutral effect on visual amenity.
Decommissioning Stage				
No potential for impacts/ Neutral effects due to: Neither the UWF Grid Connection nor the UWF Replacement Forestry will be decommissioned/harvested. In relation to the UWF Related Works and Upperchurch Windfarm, decommissioning works will involve very minor temporary works resulting in no change or improved visual amenity due to the removal of structures and windfarm associated development. This will not result in any negative impact on visual amenity.				

17.3.5 Mitigation Measures for Impacts to Visual Amenity

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 Visual Amenity as a consequence of the UWF Related Works.

17.3.6 Evaluation of Residual Impacts to Visual Amenity

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 Visual Amenity above (Section 17.3.4) – i.e. **no significant adverse impacts**.

17.3.7 Application of Best Practice and the EMP for Visual Amenity

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 **Visual Amenity,** 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-18	Best practice for the protection and preservation of tree roots during the construction phase
RW-BPM-28	Minimising Disturbance and Damage to Land

These Best Practice Measures primarily relate to Biodiversity (RW-BPM-17 and RW-BPM-18), and to Land (RW-BPM-28), they are included in full at the end of Chapter 8: Biodiversity and Chapter 9: Land, respectively. These Best Practice Measures also form part of the UWF Related Works Environmental Management Plan, which is included as Volume D with the planning application.

17.3.8 The baseline character of the areas around these projects is described in Section 7.2.2.3.Summary of Impacts to Visual Amenity

A summary of the Impact to Visual Amenity is presented in Table 17-21.

Table 17-21: Summary of the impacts to Visual Amenity

Impact to Visual Amenity:	**Intensification of activity causing visual disharmony, clutter or complexity**	**Addition of new features or loss of existing features causing visual disharmony, clutter or complexity**
Evaluation Impact Table	*Section 17.3.4.1*	*Section 17.3.4.2*
Project Life-Cycle Stage	*Construction*	*Operational*
UWF Related Works *Direct/indirect Impacts*	**Imperceptible**	**Imperceptible**
UWF Related Works *Cumulative Impacts*	**Slight to Imperceptible**	**Imperceptible**
Element 1: UWF Grid Connection	Slight to Imperceptible	Imperceptible
Element 3: UWF Replacement Forestry	Imperceptible	Imperceptible
Element 4: Upperchurch Windfarm	Not Significant	Not Significant
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 17.3.2.2.1	
Other Cumulative Impact:		
Whole UWF Project effect	**Slight to Imperceptible**	**Imperceptible**
Whole UWF Project *cumulatively with* Other Projects or Activities Milestone Windfarm Foilnaman Mast Cummermore Communications Pole Forestry activities Agricultural activities	**Slight** *(forestry)* **Not Significant** *(Milestone)*	**Not Significant**

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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17.4 Policy Context

17.4.1 National Policy

Ireland signed and ratified the Council of Europe's European Landscape Convention (ELC) which came into effect on 1 March 2004. The Convention has been ratified by thirty-eight countries. It obliges Ireland to implement policy changes and objectives concerning the management, protection and planning of the landscape. A Draft National Landscape Strategy for Ireland (2015-2025) has been prepared and is currently under review following a public consultation phase. One of the key objectives of the Strategy is the preparation of a National Landscape Character Assessment that would provide a more consistent framework for the finer scale County-based Landscape Character Assessments that have already been prepared for most counties over the past two decades.

17.4.2 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 Mid-West Regional Planning Guidelines 2010-2022 (MWRPG) state that one of the key investment priorities required to support the development of the Region is the strengthening of the electricity transmission grid in the Region. The Section on Energy and Utilities (MWRPG Section 5.6) states that there is a need to strengthen the transmission network in the Region with emphasis on three particular areas, with one of the three being the need to make provision for the connection of renewable energy resources from suitable areas of the Region. The MWRPG state that '*These Guidelines favour expediting connections and incorporate modifications proposed by EirGrid in respect of speedier connections to the National Grid by way of a positive bias toward the development of grid infrastructure*'.

Chapter 7. Environment and Amenity Strategy

7.1 Landscape P 92

Section 7.1 identifies a number of areas of landscape importance that cross Local Authority and regional boundaries. These areas require a common approach between authorities to ensure that they are managed in a consistent way. One of these is 'Slieve Felim'. Development Plan Implications are identified for these important landscape areas and these include;

A common approach to landscape management should be adopted addressing the landscape character of those geographic units of landscape importance, which cross administrative boundaries.

Landscape protection policies in Development Plans should take account of the need to manage the provision of forestry and renewable energy development and of the particular vulnerability of certain features such as bogs and mires. Landscape protection policies should also take into account the protection of ecological sites, habitats and species of ecological value, and ecological corridors and networks to ensure the overall coherence of the Natura 2000 network.

Development Plans should include policies for the management of linear landscape features such as water-courses (rivers, streams, canals, ponds, drainage channels, etc), woodlands, hedgerows and railway margins, which provide pathways for the dispersal and genetic exchange of wild species, including Plan level mitigation to ensure that such networks are maintained and, where possible, enhanced.

Policy Context

Requirements Emerging from SEA/HDA

Areas that contain or are designated as Natura 2000 sites are also liable to be included in areas designated as being of landscape importance. In considering the policies to apply in such areas, regard shall be had to the designation of the area as a Natura 2000 site

17.4.3 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 formerly 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.

Landscape Character:

Relevant landscape and visual policies are contained in Chapter 7: Landscape, Water Quality and Heritage and specifically within section 7.2 Landscape. In this section identifies that the designation of 'Primary' and 'Secondary Amenity Areas' is the key mechanism for landscape management. The upland areas of the study area within the Slieve Felim to Silvermines Mountains to the east of Newport are identified in CDP Figure 7.1 as being contained within a 'Secondary Amenity Area'. Relevant policies include;

Policy LH1: Landscape Management and Protection

It is the policy of the Council to facilitate new development which integrates and respects the character, sensitivity and value of the landscape in accordance with the designations of the County Landscape Character Assessments (or any review thereof).

Policy LH2: Protection of Visual Amenity and Character of Primary and Secondary Amenity Areas

It is the policy of the Council to ensure the protection of the visual amenity, landscape quality and character of designated Primary and Secondary Amenity Areas. Developments which would have an adverse material impact on the visual amenities of the area will not be permitted. New development shall have regard to the following:

a) Developments should avoid visually prominent locations and be designed to use existing topography to minimise adverse visual impact on the character of primary and secondary amenity areas.

b) Buildings and structures shall ensure that the development integrates with the landscape through careful use of scale, form, finishes and colour.

c) Existing landscape features, including trees, hedgerows and distinctive boundary treatment shall be protected and integrated into the design proposal.

d) Developments shall comply with the development standards set out in Chapter 10 and, as appropriate, the Rural Housing Design Guidelines contained in Appendix 5.

Policy LH3: Protection of Views of Scenic Value

It is the policy of the Council to protect and enhance views identified in Appendix 4 Listed Views in Tipperary, and views to and from lakelands and waterways. The Council will not permit development which would obstruct or have a significant adverse impact on these views

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Landscape Character Assessment of Tipperary 2016

An integrated (North Tipperary & South Tipperary) Landscape Character Assessment has recently been prepared County Tipperary and is incorporated in to the Development Plan. This provides a hierarchy of landscape units beginning with high level 'Landscape Architypes' then 'Landscape Character Types' and finally geographically distinct 'Landscape Character Areas'. The Character Assessment identifies that the landscape of the study area crosses from Landscape Architype 'B – The Lakelands' in the vicinity of Newport (western end of 110kV UGC and Mountphilips substation), into Landscape Architype 'D – The Uplands' from Castlewaller eastwards to Kilcommon and finally Landscape Architype 'C – The Foothills' east of Kilcommon towards Upperchurch.

In terms of 'Landscape Character Types' the 'Lakelands' portion of the study area is further classified as 'B2 - Lakeland Enclosures' and the 'Foothills' portion is classified as 'C2 – Forested'. There is only one class of 'Upland' landscape Character Type and this is 'D1 – Mountain & Upland'.

The relevant Landscape Character Areas directly correspond with the Landscape Architype boundaries identified above. That is, 'the Lakelands' portion is corresponds with 'LCA 12 – River Shannon – Newport', 'the Uplands' portion corresponds with 'LCA 18 – Silvermines – Rearcross' and 'the Foothills' corresponds with LCA 17 Upperchurch, Kilcommon & Hollyford Mountain Mosaic'.

Landscape sensitivity in relation to each Landscape Character Area is determined by combining factors of slope, elevation, land cover and soils and classified into five categories from Class 1 – Low sensitivity to 'Class 5 Unique' sensitivity. LCA 17 and LCA 18 are both contained within the median of the five landscape sensitivity categories being, 'Class 3 – Sensitive' (Table 5.2). LCA 12 is classified as 'Class 4 – Transitional Vulnerability'.

Visual Amenity:

'Scenic Views and Prospects of Tipperary' are identified in Appendix II of the landscape Character Assessment. Relevant scenic views for the WWP include **V57** – 'Views north and south on sections of the R503 from Newport to Ballycahill, and; **V58** – 'Views east and west of the R497 from the R503 through the mountains to Dolla - including Mother Mountain to the West, Knockacreggan to the East, Coneen Hill to the East and the Silvermines to the west'.

Best Practice Measures

17.5 Best Practice Measures

The following Best Practice Measures have been developed primarily for the protection of Biodiversity and Land, but will also protect **Landscape**:

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
RW-BPM-28	Minimising Disturbance and Damage to Land

As these Best Practice Measures primarily relate to the protection of Biodiversity and Land, they are included in full at the end of Chapter 8: Biodiversity and Chapter 9: Land, respectively.

Topic Landscape

17.6 Summary of the Landscape Chapter

UWF Related Works is located in a rugged rural upland comprising of moderate and steep sided valleys that are cloaked in a combination of forestry and agricultural grassland. The area is sparsely populated, closest settlements include the villages of Upperchurch and Kilcommon. There are also two scenic routes and three waymarked trails within the study area.

Sensitive Aspects of Landscape, examined in this topic chapter, include Landscape Character and Visual Amenity.

The UWF Related Works was evaluated for potential to cause impacts to Landscape as a result of any alterations or divisions of land cover and vegetative patterns, any reduction in rural tranquillity or landscape integrity due to an intensification of activity in the area, or any visual disharmony or clutter caused by the addition/loss of above ground features in the area.

Project Design Measures will be implemented during construction works, these include the use of flagmen at temporary site access points rather than providing sightlines through the removal of roadside boundaries, and the control of construction schedules in the Knockmaroe/Knockcurraghbola area to reduce the intensity of construction activity in that area.

17.6.1 Summary of UWF Related Works Impacts

- Adverse impacts to both Landscape Character and Visual Amenity will be Imperceptible.

17.6.2 Summary of UWF Related Works Cumulative Impacts

- Cumulative impacts to Landscape Character and Visual Amenity of UWF Related Works, Upperchurch Windfarm, UWF Grid Connection and UWF Replacement Forestry where they all occur together is considered Slight in relation to land cover and vegetation patterns; Imperceptible from an intensification of activity and no greater than Slight from alterations of land cover during the construction stage. Cumulative Impacts on rural tranquility during co-construction of UWF Related Works and Upperchurch Windfarm is considered Imperceptible.

- The cumulative effect on Landscape Character and Visual Amenity during the operating stage, is considered Imperceptible. UWF Related Works will not noticeably contribute to the integrity of rural landscape patterns and addition of visual features and therefore will not contribute to these effects from the operating Upperchurch Windfarm.

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

As the UWF Related Works is one part of the Whole UWF Project, the cumulative impacts with the Other Elements of the Whole UWF Project are summarised below.

- Cumulative impacts due to an intensification of activity will not be greater than Imperceptible, in relation to Landscape Character, and Slight-Imperceptible in relation to Visual Amenity. Cumulative landscape character impacts due to alterations of land cover will be no greater than Slight.

- During the operational stage, cumulative impacts of the UWF Related Works with the Other Elements will be Imperceptible.

Summary of the Landscape Chapter

17.6.4 Cumulative Impacts with Other Projects or Activities

- Cumulative effects of the Elements of the Whole UWF Project with Other Projects or Activities during the construction stage relates to Forestry and Agricultural activities. Cumulative impacts to either Landscape Character or Visual Amenity will be no greater than Slight.

- Cumulative effects of the Elements of the Whole UWF Project with Other Projects or Activities during the operational stage relates to the Milestone Windfarm (operational since 2018), and the existing Foilnaman Mast and existing Cummermore Communications Pole. Cumulative impacts to either Landscape Character or Visual Amenity will be Slight/Not Significant.

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Topic Landscape

17.7 Reference List

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Topic Landscape

UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 18: Interaction of the Foregoing

ECOPOWER

January 2019

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Glossary of Terms

Term	Definition
Environmental Factors	The factors in the environment required to be identified, described and assessed during the EIA process. These are specified in Article 3 (1) of the EIA Directive as Population and Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets; Cultural Heritage and Landscape.
Whole UWF Project	Project made up of 5 No. elements – UWF Grid Connection; UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities.

List of Abbreviations

Abbreviation	Full Term
EMF	Electromagnetic Frequencies
GHG	Green House Gasses

18 Interaction between the Environmental Factors

18.1 Cross Factor effects between the Environmental Factors

Interaction between the environmental factors relates to cross-factor effects, which are indirect effects. A cross factor effect occurs when the effect on one environmental factor causes an indirect effect on another environmental factor.

In Chapters 6 to 17, the potential for likely direct and indirect effects was evaluated. Potential cross factor effects were identified during EIAR Team meetings and evaluated by the authors of the receiving environmental factor topic chapter.

Likely cross factor effects that were examined in the environmental factor topic chapters are identified and summarised in the sections below, presented by receiving environmental factor.

18.1.1 Potential Cross-Factor effects to Population (Chapter 6)

- Potential cross-factor effects to **Population** (reduction in tourism revenue), caused by effects to **Air** (increased levels of ambient dust and ambient noise).
- Potential cross-factor effects to **Population** (business disruption), caused by effects to **Material Assets - Roads** (increased traffic and road works).
- Potential cross-factor effects to **Population** (reduction in tourism revenue), caused by effects to **Landscape** (visual impacts).

18.1.2 Potential Cross-Factor effects to Human Health (Chapter 7)

- Potential cross-factor effects to **Human Health** (improved health prospects), caused by effects to **Population** (increased spending and employment opportunities in the Local Economy),
- Potential cross-factor effects to **Human Health** (impacts on gastrointestinal health), caused by effects to **Water** (water quality or quantity effects to local wells and springs)
- Potential cross-factor effects to **Human Health** (impact on health, respiratory, cardiovascular and mental health), caused by effects to **Air** (increase in ambient dust, noise, EMF)
- Potential cross-factor effects to **Human Health** (impacts on gastrointestinal health), caused by effects to **Material Assets - Built Services** (contamination or disruption of public piped water supply)
- Potential cross-factor effects to **Human Health** (risk of injury), caused by effects to **Material Assets – Roads** (increased risk of road traffic accidents).

18.1.3 Potential Cross-Factor effects to Biodiversity (Chapter 8)

- Potential cross-factor effects to **Biodiversity** (habitat loss, fragmentation or degradation, loss of flora species, physical injury), caused by effects to **Soils** (excavation, relocation, erosion and contamination effects to soils).
- Potential cross-factor effects to **Biodiversity** (aquatic habitat degradation and degradation of Marsh Fritillary habitat), caused by effects to **Water** (decreases in water quality *as a result of cross factor soil effects*

and morphological impacts to watercourses during crossing works, along with changes in drainage regimes in water dependent habitats due to *cross factor Soils effect (excavation of soils).*

- Potential cross-factor effects to **Biodiversity** (habitat degradation, disturbance and displacement of Bats and Non-Volant Mammals), caused by effects to **Air** (due to dust soiling, increased ambient noise and vibration levels).

18.1.4 Potential Cross-Factor effects to Land (Chapter 9)

- Potential cross-factor effects to **Land** (reduction in forestry/grass growth rates), caused by effects to **Water** (change in drainage regimes).

18.1.5 Potential Cross-Factor effects to Soils (Chapter 10)

No cross-factor effects to **Soils,** caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.6 Potential Cross-Factor effects to Water (Chapter 11)

- Potential cross-factor effects to **Water** (decreases in water quality due to sedimentation or contamination), caused by effects to **Soils** (earthworks, groundworks, storage of overburden, erosion and contamination effects to soils from fuel, oil and cement).

18.1.7 Potential Cross-Factor effects to Air (Chapter 12)

- Potential cross-factor effects to **Air** (increased ambient levels of dust), caused by effects to **Soils** (earthworks, groundworks, storage of overburden, erosion).
- Potential cross-factor effects to **Air** (increased ambient levels of dust and noise), caused by effects to **Material Assets - Roads** (increase in traffic volumes).

18.1.8 Potential Cross-Factor effects to Climate (Chapter 13)

- Potential cross-factor effects to **Climate** (reduced CO^2 emission offsets), caused by effects to **Land** (land use change through permanent forestry felling).
- Potential cross-factor effects to **Climate** (Increases in GHG emissions), caused by effects to **Soils** (release of embodied emissions due to excavations) and effects to **Material Assets - Roads** (increase in traffic volumes).

18.1.9 Potential Cross-Factor effects to Material Assets - Built Services (Chapter 14)

- Potential cross-factor effects to **Material Assets – Built Services** (risk of damage to water pipes and subsequent contamination of public water supply), caused by effects to **Material Assets - Roads** (excavation of road pavements).

18.1.10 Potential Cross-Factor effects to Material Assets - Roads (Chapter 15)

No cross-factor effects to **Material Assets – Roads,** caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.11 Potential Cross-Factor effects to Cultural Heritage (Chapter 16)

- Potential cross-factor effects to **Cultural Heritage** (visual setting), caused by effects to **Landscape** (visual impact of above ground structures).

18.1.12 Potential Cross-Factor effects to Landscape (Chapter 17)

Potential cross-factor effects to **Landscape** (character), caused by effects to **Biodiversity** (severance of hedgerows and removal of mature trees) and effects to **Land** (change of use).

18.2 Potential Cross Factor Effects – Other Elements of the Whole UWF Project

Cross factor effects to environmental factors associated with the Other Elements of the Whole UWF Project can be found in the corresponding EIAR Main Report Chapter 18 of the UWF Replacement Forestry EIA Report, which is included in Volume F: Reference Documents.

UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 19: Monitoring Arrangements

ECOPOWER

January 2019

Contents

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Glossary of Terms

Term	Definition
Environmental Commitments	The environmental protection measures including Project Design Measures, Best Practice Measures and Management Plans which were developed during the EIA process and incorporated into the Environmental Management Plan as Environmental Commitments.
Environmental Factors	The factors in the environment required to be identified, described and assessed during the EIA process. These are specified in Article 3 (1) of the EIA Directive as Population and Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets; Cultural Heritage and Landscape.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.

List of Abbreviations

Abbreviation	Full Term
EMP	Environmental Management Plan
UWF	Upperchurch Windfarm

19 Monitoring Arrangements

19.1 Introduction

Monitoring measures are the procedures to keep under systematic review the significant adverse effects on the environment resulting from the construction and operation of a Project, and to identify unforeseen significant adverse effects, in order to be able to undertake appropriate remedial action.

The arrangements will involve an Environmental Clerk of Works team, monitoring the implementation of a suite of environmental protection measures – Project Design Measures, Best Practice Measures and Management Plans which have been developed to avoid, prevent or reduce significant effects on the receiving environment. It should be noted that the **conclusion for all the sensitive aspects** of the Environmental Factors **is that no significant adverse effects are likely to occur**.

19.2 Schedule of monitoring measures

This EIAR was submitted with the planning application to Tipperary County Council on 17/07/2018. A Request for Further Information was issued on 10/09/2018 wherein a comprehensive Schedule of Monitoring Measures was requested.

In response to RFI, a Schedule of these Monitoring Measures has been collated from the EIA Report and the EMP. Monitoring measures are included throughout the EIA Report and Environmental Management Plan (EMP). In particular, monitoring measures are part of the Project Design Environmental Protection Measures (PDs), the Traffic Management Plan, the Surface Water Management Plan, the Invasive Species Management Plan, the Waste Management Plan and the Best Practice Measures (BPMs), which plans are all part of UWF Related Works Environmental Management Plan (EMP). This Schedule of Monitoring Measures is reproduced below.

Table 19.1: Schedule of Monitoring Measures

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
EIA Report EMP	PD4	Confirmatory consultations with Irish Water, Eir and ESB and confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a foreman will look out for underground pipes during excavations near services.
EIA Report EMP	PD8	All initial groundworks will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works. Where excavations occur in areas of archaeological potential such as fording points and associated marsh lands and watercourses all excavated material will be spread out and metal detected (under licence to National Monuments Service) as part of the finds retrieval strategy.

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
EIA Report EMP	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~~, 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 for UWF Related Works will take place ~~within 500m of an active hen harrier breeding attempt or active nesting activity,~~ during the hen harrier breeding season (March to August).
EIA Report EMP	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.
EIA Report EMP	PD34	Confirmatory surveys will be carried out within 50m of either side of the construction works area boundary of identified badger setts to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the intervening period following initial pre-planning surveys and the commencement of construction activity. These confirmatory badger surveys will be undertaken no more than 10-12 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).
EIA Report EMP	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.
EIA Report EMP	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).
EIA Report EMP	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

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
		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).
EIA Report EMP	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.
EMP Tab 3 Traffic Management Plan	1.3.8. and 1.4.4	Along construction materials haulage routes, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and falling weight deflectometer (FWD) surveys will be undertaken along the routes of concentrated construction traffic between the R503 and the site access points. Whilst it is not expected to occur, any damage to structures or road pavements will be repaired to at least as good a condition as pre-works, and on damaged sections of roads where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250, full-width surface overlay will be carried out.
EMP Tab 4 Surface Water Management Plan	3.4	Water quality monitoring will be undertaken visually, and the contractor will have informed the Environmental Clerk of Works of any observed issues Work will not continue again until the source of the pollution is identified and eliminated
EMP Tab 4 Surface Water Management Plan	4.1	• Daily general visual inspections by Environmental Clerk of Works; • Weekly (existing & new drains) inspections by site Construction Manager; • All inspection to include all elements of drainage systems; • Inspections required to ensure that drainage systems are operating correctly and to identify any maintenance that is required; • Any changes, such as discolouration, odour, oily sheen or litter should be noted and corrective action should be implemented immediately. • High risk locations such as settlement ponds will be inspected on a daily basis by the Construction Manager; • Daily inspections checks will be completed on plant and equipment, and whether materials such as straw bales or oil absorbent materials need replacement;

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**

		• Event based inspections by the Environmental Clerk of Works as follows:
		  ○ >10 mm/hr (*i.e.* high intensity localised rainfall event);
		  ○ >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or,
		  ○ Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
		• Monthly site inspections by the Project Hydrologist during construction phase; and,
		• Quarterly site inspections by independent hydrologist during the construction phase and for a period of 6 months following construction.

EMP Tab 4 Surface Water Management Plan	4.2.1	Field monitoring of water quality parameters and collection of samples will be undertaken by the Environmental Clerk of Works. He/she will be appropriately trained on the required monitoring methods and the use, calibration and maintenance of all monitoring equipment used.
EMP Tab 4 Surface Water Management Plan	4.2.2	Surface water quality will be monitored during the construction phase and this monitoring will also extend into the post construction phase. Proposed monitoring locations downstream of the works areas (no. 6 in total) within the local surface water bodies (i.e. Clodiagh River, Owenbeg River, Turraheen River and Bilboa River) are shown on Figure SWMP 3.
EMP Tab 4 Surface Water Management Plan	4.2.3	Laboratory analysis of water samples will also be undertaken as part of the monitoring programme by an independent and appropriately certified laboratory.
EMP Tab 4 Surface Water Management Plan	4.2.4	Monitoring frequency will be specified and finalised following consultation with Inland Fisheries Ireland and Tipperary County Council prior to commencement of construction. As a minimum, the monitoring programme will include: • Daily visual checks; • Weekly sampling for suspended solids and turbidity in catchments where tree felling, earthworks or watercourse crossing work is on-going and monthly monitoring for all other parameters; • Event based sampling, e.g. after heavy rainfall; • Additional sampling in the event of trigger level exceedance, after heavy rainfall, etc., • Post construction sampling programme (monthly sampling) for a period of six months.

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
		• The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.
EMP Tab 5 Invasive Species Management Plan	Appendix R2 – Biosecurity Measures	A full time invasive species specialist will be appointed to monitor key stages in construction, particularly when soil excavation begins near infested areas. The invasive species specialist will have a 'stop works' authority;
EMP Tab 6 Waste Management Plan	1.5.1	The measured waste quantities will be used to quantify the costs of management and disposal in a Waste Audit Report, which will also record lessons learned from these experiences which can be applied to future projects. This report will be produced by the PSCS using inputs from the Waste Audit. The total cost of construction waste management will be measured and will take account of the purchase cost of materials, handling costs, storage costs, transportation costs, revenue from sales, disposal costs etc.
EMP Tab 7 Best Practice Measures	BPM 3	• All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.
EMP Tab 7 Best Practice Measures	BPM 6	• 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; • Inspection of all areas reported as having unusual ground conditions, • Pre-felling surface water sampling will be undertaken at the main water-course downstream of the works area (sampling will be completed during a wet period). • Surveying of drainage and ground conditions before and during tree felling activities.
EMP Tab 7 Best Practice Measures	BMP 07	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.
EMP Tab 7	BPM 12	• Monthly surveys following (SNH) guidance will be undertaken by a suitably qualified Ornithologist

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
Best Practice Measures		• 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. 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.
EMP Tab 7 Best Practice Measures	BPM 13	• 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.
EMP Tab 7 Best Practice Measures	BPM 14	• 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.

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
EMP Tab 7 Best Practice Measures	BMP 15	• 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 • 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.
EMP Tab 7 Best Practice Measures	BPM 16	• 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.
EMP Tab 7 Best Practice Measures	BPM 17	• 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).
EMP Tab 7 Best Practice Measures	BPM 18	• All works within a Root Protection Area (RPA) (see NRA guidance (2006) for calculation of the RPA) will be supervised by the Project Ecologist.
EMP Tab 7 Best Practice Measures	BPM 19	• Kingfisher: 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).

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
		• 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). • 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.
EMP Tab 7 Best Practice Measures	BPM 20	• Badger: Surveying 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).
EMP Tab 7 Best Practice Measures	BPM 21	• Other Mammals: • Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times. • Confirmatory surveys (of suitable habitat) for the presence/absence of other mammals 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. • 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).
EMP Tab 7	BPM 22	• Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and which has

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
Best Practice Measures		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.
EMP Tab 7 Best Practice Measures	BPM 23	• Monitor the construction activities when working adjacent to amphibian breeding habitat to ensure that mitigation measures are strictly adhered to at all times. • 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.
EMP Tab 7 Best Practice Measures	BPM 24	• Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times. • 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.
EMP Tab 7 Best Practice Measures	BPM 25	• March Fritillary: 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. • 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. • 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.

Schedule of Monitoring Measures		
Location in EIAR or EMP	**Measure/ Section No.**	**Description of Monitoring Measure**
EMP Tab 7 Best Practice Measures	BPM 26	• Monitor the recruitment and training of local employees in line with Policy
EMP Tab 7 Best Practice Measures	BPM 29	• During movement of materials both on and off-site, trucks will be covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected by a visual inspection by a competent person to ensure no potential for dust emissions. If dust potential exists it will be mitigated using the appropriate measures such as wheel washing or covering of materials.
EMP Tab 7 Best Practice Measures	BPM 30	• Public Roads: Along construction materials haulage routes, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken along the routes of concentrated construction traffic between the R503 and the site entrances on the local road network. Whilst it is not expected to occur, any damage to structures or road pavements will be repaired to at least as good a condition as pre-works, and on damaged sections of roads where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250, full-width surface overlay will be carried out.
EMP Tab 7 Best Practice Measures	BPM 31	• A confirmatory survey of Electromagnetic Field emissions from locations along the Internal Windfarm Cabling will be carried out by a competent engineer. The locations along the Internal Windfarm Cabling will include the following 9 No. local road crossings in Knockmaroe/Knockcurraghbola Crownlands, Knockcurraghbola Commons and Foilnaman. • Reporting by the competent engineer of the compliance of operational EMF emission levels with the levels predicted in the 2018 EIA Report.
EMP Tab 7 Best Practice Measures	BPM 32	• Recording and reporting of the annual renewable electricity production of the operational UWF.
EMP Tab 8 OCM's	RW-OCM-01	Pre-Construction Windfarm Monitoring Activities • Road condition monitoring surveys, the first of which will take place prior to the commencement of construction activities. • Pre-construction water quality monitoring surveys, will be carried out • Pre-construction ecological confirmatory surveys.

19.3 Duration of Monitoring

As most potential for adverse effects to the environment would occur during the construction stage of the UWF Related Works, monitoring arrangements concentrate on this stage of the development, with some monitoring surveys continuing during the early operational stage (c. first 3 to 5 years of operation).

19.4 Resourcing of Monitoring Arrangements

The Project Promoter will be responsible for the costs of monitoring and will provide sufficient resources to the Environmental Clerk of Works to monitor, auditing and report on the compliance of construction works with the EMP. Sufficient resources will also be provided to the Environmental Clerk of works to engage a team of Environmental Managers to assist with monitoring and auditing, and for specialist environmental and engineering consultants as required.

19.5 Implementation of the environmental protection measures in the EMP

To facilitate the implementation and monitoring of the environmental protection measures, they have been incorporated into the Environmental Management Plan (EMP).

19.6 Compliance with the EMP and Unforeseen Significant Adverse Effects

An Environmental Clerk of Works will be employed during the construction and early operational stages. The Environmental Clerk of Works will be resourced with a team of Environmental Managers and environmental specialists. The project EMP will be used by the Environmental Clerk of Works and the Clerk's team of managers/experts, to audit compliance of the Contractors with the EMP.

The Environmental Clerk of Works will have a full time presence on-site during the construction stage, and environmental experts will supervise works at environmentally sensitive locations. This will ensure that any unforeseen significant adverse effects are identified and appropriate remedial action taken immediately.

The Environmental Clerk of Works will have a 'stop-works' authority to temporarily stop works over part of the site to avoid either an infringement of the Environmental Commitments or an unforeseen adverse environmental event. Works will not be allowed to re-commence until the issue is resolved.

19.6.1 Environmental Management Plan

An Environmental Management Plan (EMP) has been prepared for the UWF Related Works and describes the approach to environmental management during the construction and early operational stages.

The objectives of the EMP are to:

(a) identify management responsibilities and reporting requirements for environmental management;

(b) identify the relevant Environmental Commitments;

(c) set out the environmental protection measures to be implemented;

(d) Outline how compliance with the EMP will be achieved; and

(e) Promote best environmental practices for the duration of the development.

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19.6.2 Environmental Commitments in the EIA Report

The environmental protection measures identified in this EIA Report form the Environmental Commitments in the UWF Related Works Environmental Management Plan. The current List of Environmental Commitments is presented in Table 19-1. The list of Environmental Commitments will be updated post consent with any additional requirements of planning conditions or statutory bodies.

Table 19-1: List of Environmental Commitments for UWF Related Works

Environmental Commitment	**Source**	**Implemented By:** **Construction Manager/Project Manager** **Env. Clerk of Works / Other**
The Project Promoter is committed to implementing the **Project Design Measures** PD01 to PD43.	EIAR, Ch.5	Project Team and specialist environmental and engineering experts
The Project Promoter is committed to implementing the **Traffic Management Plan.**	EMP, Tab 3	Project Team
The Project Promoter is committed to implementing the **Surface Water Management Plan.**	EMP, Tab 4	Project Team Site Ecologist Site Hydrologist
The Project Promoter is committed to implementing the **Invasive Species Management Plan.**	EMP, Tab 5	Project Team Site Ecologist
The Project Promoter is committed to implementing the **Waste Management Plan.**	EMP, Tab 6	Project Team
The Project Promoter is committed to implementing **Best Practice Measures** RW-BPM-01 to RW-BPM-32.	EMP, Tab 7	Project Team Site Ecologist Site Hydrologist
The Project Promoter is committed to **monitoring** the development to check that the project is in practice, conforming to the predictions made in the EIA Report.	EIAR, Ch.5	Project Team and specialist environmental and engineering experts

19.7 Responsibilities & Management

It will be the overall responsibility of the Project Promoter to ensure that the UWF Related Works is developed as consented. The implementation of the Environmental Commitments will be the responsibility of the Project Manager and a contractual obligation on the Construction Site Manager during the construction stage.

The protection of the environment during construction works and early operational stage will be managed through the UWF Related Works Environmental Management Plan (EMP). During construction, monitoring and auditing of the compliance of UWF Related Works with the EMP, will be carried out by an Environmental Clerk of Works, who will be independent of the Construction Contractor. The Environmental Clerk of Works will work with a suitably qualified team. The Environmental Clerk of Works will prepare weekly EMP Compliance Reports.

During operation, monitoring and auditing of the compliance of UWF Related Works with the EMP will be the responsibility of the Project Promoter for Upperchurch Windfarm. The work will be carried out by the Upperchurch Windfarm Environmental Manager.

19.8 Conclusion

The monitoring arrangements will involve an Environmental Clerk of Works team, monitoring the implementation of the Environmental Commitments, which have been developed to avoid, prevent or reduce significant effects on the receiving environment.

To facilitate the implementation and monitoring the Environmental Commitments, these measures have been incorporated into the Environmental Management Plan (EMP). A Schedule of Monitoring is included above at 19.2.

The Project Promoter will contractually oblige Contractors to carry out the works according to the EMP, during construction. Monitoring and auditing of the compliance with the operational stage Environmental Commitments will be the responsibility of the Project Promoter for Upperchurch Windfarm. The work will be carried out by the Upperchurch Windfarm Environmental Manager.

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Chapter 20: Executive Summary of the UWF Related Works Revised EIA Report

EIAR Coordinator:

January 2019

Contents

Glossary of Terms

Term	Definition
EIA Directive	European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU)
Environmental Factors	The factors in the environment required to be identified, described and assessed during the EIA process. These are specified in Article 3 (1) of the EIA Directive as Population and Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets; Cultural Heritage and Landscape.
Competent Authority	The body legally delegated to decide on the Planning/Licence Application
Competent Expert	Experts who are qualified and competent in their field of expertise
Consented Windfarm	Upperchurch Windfarm – 22 wind turbines, substation, windfarm roads and ancillary works, consented in August 2014 under Planning Reference: Tipperary County Council 13/51/0003, ABP PL 22.243040
Element	One of the 5 No. elements listed in 'Whole UWF Project' below.
Joint Bay	Joint Bays are underground chambers, regularly placed along the UWF Grid Connection 110kV UGC, within which separate lengths of cable are joined together.
Project Design Environmental Protection Measures	Measures for environmental protection, incorporated into the design of the project.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Whole UWF Project	Project made up of 5 No. elements – UWF Grid Connection; UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities.

List of Abbreviations

Abbreviation	Full Term
DAU	Developments Application Unit of Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
EDL	Ecopower Developments Limited
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
RFI	Response to Further Information
ESBN	ESB Networks – Distribution System Operator (DSO)
IFI	Inland Fisheries Ireland
NPWS	National Parks and Wildlife Services of Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
OHL	Overhead Line (electricity)
SAC	Special Area of Conservation
SPA	Special Protection Area (for wild birds)
UGC	Underground Cables
UWF	Upperchurch Windfarm

20 Executive Summary of the UWF Related Works Revised EIA Report

20.1 Introduction

20.1.1 Application to Tipperary County Council

An Environmental Impact Assessment Report (EIA Report or EIAR[1]) was prepared to accompany a planning application by Ecopower Developments Limited to Tipperary County Council for works relating to the construction and operation of the already consented Upperchurch Windfarm (UWF) – to be called UWF Related Works. The planning application was submitted on 17/07/2018, FI was requested on 10/09/2018. Tipperary County Council Refused Permission on 10th January, 2019.

The UWF Related Works project has not been changed in terms of location and characteristics for the Appeal to An Bord Pleanála.

However the original May 2018 EIA Report has been revised for the subject appeal to An Bord Pleanála – to be called Revised EIA Report (EIAR). The revisions to the May 2018 EIAR were necessary in order to take account of the Reason for Refusal by Tipperary County Council of UWF Related Works; the 2 No. Tipperary County Council Planner's Reports (dated 06/09/2018 and 10/01/2019); and the Submission to Tipperary County Council on UWF Related Works from NPWS dated 13.12.18. These revisions are detailed in Chapter 1 of this Revised EIAR.

The Subject Application, **UWF Related Works, is part of the whole Upperchurch Windfarm project**, which also includes UWF Grid Connection, which application for permission was being made directly to An Bord Pleanála under Section 182A (9) of the Strategic Infrastructure Act (2006), because it includes high voltage infrastructure. Permission was refused by the Board on 17/12/2019 because it was considered that the route of the 110kV Underground Cable was not acceptable. Alternative routes are being evaluated, and at the time of writing the preliminary preferred route is along the Regional Road R503 through Newport. The final route selected will be part of a new UWF Grid Connection application, probably to An Bord Pleanála in the coming months. Changing of the 110kV cable route required also that a revised cumulative evaluation for all the environmental topics evaluated in the UWF Related Works EIAR, be carried out, which revisions are part of the cumulative evaluation sections of this Revised EIAR and are based on the preliminary preferred route of the 110kV UGC along the R503 through Newport.

The **UWF Related Works planning application comprises a suite of application particulars**, which include

> The planning application and appeal comprises a suite of particulars, which include
>
> a) the Revised EIA Report and accompanying Figures and Appendices; Revised Appropriate Assessment Reporting and revised Environmental Management Plan which are being submitted as part of this Appeal to ABP and
>
> b) Planning Documents; Planning Drawings; and Reference Documents which are unchanged for the appeal and which were submitted to Tipperary County Council as part of the Planning Application.

[1] Directive 2011/92/EU as amended by 2014/52/EU uses the term environmental impact assessment report rather than environmental impact statement. EIA Report and EIAR are used throughout these submission documents, in the place of EIS and Environmental Impact Statement.

20.1.2 The Subject Development

UWF Related Works, comprises the following elements:

- Internal Windfarm Cabling
- Realigned Windfarm Roads
- Haul Route Works
- Telecom Relay Pole
- RW Ancillary Works

The **Internal Windfarm Cabling** will connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables in agricultural; forestry lands; and across public roads; in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. Approximately 62% of the Internal Windfarm Cabling is proposed to be located under Consented UWF Roads or Realigned Windfarm Roads, with the remaining Cabling in the vicinity of the windfarm site.

The Internal Windfarm Cabling consists of electrical cables, communication cables and the copper conductor cables which are installed inside ducting in underground trenches. Cable Protection and Warning Tapes will also be laid in the trench. The trench will be excavated, ducting and warning tapes installed and the trench backfilled and reinstated, the cables will then be pulled through the ducting. The only surface expression of the Internal Windfarm Cabling will be the over-ground identification marker posts and marker plates which will be installed at regular intervals above the cables trench.

The **Realigned Windfarm Roads** are two sections of the already consented windfarm roads which require realignment and one length of new road to link a telecoms mast to the windfarm road. The roads are proposed for agricultural and forestry lands in the townlands of Shevry, Knockmaroe, and Grousehall, which are all within the Upperchurch Windfarm site.

The **Haul Route Works** are proposed for public road verges, roadside boundaries and grassland fields located adjacent to the L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 and R503 roads in the following townlands: Shevry, Knockcurraghbola Commons, Knocknabansha, Knockmaroe and Grousehall. Works include the removal of soils and laying of crushed stone and hard-core in roadside verges; temporary removal or part-removal of roadside boundaries; opening of temporary entrances and the construction of temporary access roads on private lands.

The **Telecom Relay Pole** is an 18m wooden pole proposed for a location in Knockmaroe townland, close to the existing Foilnaman Mast. Laghtseefin Mast is 9.5km directly south. The Relay Pole will be contained within a small compound, and a low voltage power and communications supply will be provided from the existing Foilnaman Mast. A short length of access road, Realigned Windfarm Road No. RWR3, will provide access to the Telecom Relay Pole from the Consented UWF Road network.

RW Ancillary Works will facilitate the construction of the UWF Related Works and will include temporary access roads; temporary and permanent watercourse crossings; temporary site entrances; change of use from 'agriculture' to 'forestry and agriculture' at an entrance to a proposed new forestry replanting area

(UWF Replacement Forestry) at Foilnaman; along with forestry felling; temporary and permanent hedgerow/tree removal; permanent hedgerow replanting; fencing; relocation of existing telephone poles and temporary storage of excavated materials; at various locations within construction works area boundaries.

20.1.3 The Whole UWF Project

The UWF Related Works is part of a whole project, which comprises the following other elements – UWF Grid Connection, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities. These are collectively referred to as the Whole UWF Project in this EIA Report.

The purpose of the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities elements is to facilitate the construction and operation of the already consented but not yet built Upperchurch Windfarm (UWF). Upperchurch Windfarm was granted planning permission in August 2014 under Planning Reference: Tipperary County Council 13/51/0003, ABP PL 22.243040 for twenty two wind turbines and an electrical substation, and when operational, will produce renewable electricity from the wind to supply the national electricity grid.

The vast majority of the Whole UWF Project is located in County Tipperary with some minor activities (Haul Route Activities) along the Upperchurch Windfarm turbine component haul route and on the existing Killonan to Nenagh 110kV overhead line (Overhead Line Activities), in County Limerick. The vast majority of the interaction of the Elements is in and around the already consented Upperchurch Windfarm.

The descriptions in the Compiled Description of UWF Grid Connection and the Compiled Description of UWF Other Activities; the assessments contained in the UWF Replacement Forestry EIA Report and the Environmental Impact Statement and other planning documents associated with the already consented Upperchurch Windfarm have informed the cumulative assessments of the whole project in this, the UWF Related Works Revised EIA Report. These documents were submitted with the planning application to Tipperary County Council for UWF Related Works in a separate volume - Volume F: Reference Documents. (also on the dedicated website www.upperchurchwindfarm.ie)

20.2 Summary of Chapter 2: The EIAR Process including Scoping

20.2.1 Legislative Context

The Environmental Impact Assessment (EIA) of projects is governed by the terms of European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment. (The EIA Directive)

The previous Directive - Directive 2011/92/EU has been amended by Directive EIA 2014/52/EU, in a number of respects. Generally the amending EIA Directive is an elaboration/expansion of matters referred to in the 2011 Directive, with additional matters to be considered. The amending Directive was transposed to Irish Planning Law in September 2018. The May 2018 EIA Report and this Revised EIA Report have been prepared in compliance with the requirements of both 'Directive 2011/92/EU' and 'Directive 2011/92/EU as amended by 2014/52/EU' and fulfils all the requirements of an EIS under Directive 2011/92/EU as well as the requirements of an Environmental Impact Assessment Report under Directive 2011/92/EU as amended by 2014/52/EU.

UWF Related Works as an independent project does not require that an EIA be carried out, however it is part of the Whole UWF Project, one element of which, Upperchurch Windfarm, did require that the competent authority carry out an EIA. In order to assist the cumulative assessment of the Whole UWF Project, EDL has prepared and EIA Report for the subject development, UWF Related Works.

20.2.2 The EIA Report

In the EIA Report, the following environmental factors are examined by competent experts[2] - Population & Human Health; Biodiversity[3]; Land, Soils, Water; Air including air quality, noise & vibration and electromagnetic fields; Climate; Material Assets including Built Services (electricity network, communication network, water supply infrastructure) and Roads; Cultural Heritage and Landscape.

Scoping is the process of determining the content and extent of the information to be submitted to the Competent Authority to ensure that the environmental assessment is focused on the project's most significant effects on the environmental factors. Scoping was carried out throughout the whole EIA Report preparation process and appeal process for the Subject Development.

Each environmental factor has a dedicated chapter and was prepared by specialists who are competent in their field of expertise. The EIA Report aims to focus on the development's likely and significant effects on the topics listed. However all impacts, including impacts considered to be neutral, are presented in order to facilitate an evaluation of the cumulative effects of the UWF Related Works together with the Other Elements of the Whole Project and with other existing or consented projects or activities in the area.

[2] Competent Experts: Article 5(3) Directive 2014/52/EU
[3] Referred to as 'Flora and Fauna' in Directive 2011/92/EU

20.2.3 Presentation of the EIA Report

Accessibility, legibility and clarity were the key considerations when organizing the lay-out of the EIA Report Chapters. In this Revised EIAR Main Report (Volume C2), the information in the Environmental Factor topic Chapters 6 to 17 is prepared by different **competent experts** but presented in the chapters using a **standardised structure** with a **pre-defined layout, terms and definitions; standard evaluation processes (including scoping) and standard descriptive methods and impact descriptions** in order to ensure that all likely and significant effects are clearly communicated, placed in context and easily cross-referenced.

- So that the information for the **cumulative evaluation** is clearly distinguishable from the information on the actual development being applied for, **all cumulative information sections are highlighted in grey**.

- **Mapping and Illustrations, including maps, plans, sections and diagrams** are presented in a **separate volume – Volume C3: Revised EIAR Figures** so that they can be prepared at a scale that is legible and so that they do not distract from the flow of the text.

- **Appendices** have been used for including detailed or supplementary information and photographs that are not core to the EIA Report but which are nonetheless required for a more detailed understanding, or technical scrutiny of important issues. These are contained in a **separate volume – Volume C4 Revised EIAR Appendices**.

- A **Non-Technical Summary** is presented in a handy, short separate volume with figures included. This Summary is contained in a separate volume – Volume C1 Revised Non-Technical Summary.

20.2.4 EIA Report Review

Two checklist reviews of the EIA Report, were carried out by the EIA Report Co-ordinator;

- A **CHECKLIST** review of compliance with the EIA Directive and Planning and Development Regulations 2001 (as amended).

- A **CHECKLIST** review of the completeness of the information in the EIA Report.

As well as the EIAR Team, this checklist can be used by the Planning Authority and members of the public involved in the consultation process, as a quick guide to the location and sufficiency of all of the information provided in this EIA Report.

20.3 Summary of Chapter 3: The Scoping Consultations

20.3.1 Legislative Context

Article 6 of the EIA Directive requires consultations with two different groups on the content of the EIA Report - 1) public authorities who are likely to be concerned, and 2) the public.

Scoping consultation in the form of written consultation and responses and/or face-to-face meetings took place with Competent Authorities; Statutory Bodies and Other Parties that are likely to be concerned; and The Public in the general area of development.

All feedback received was considered and given due consideration in the final design of the subject development; in the content and the extent of the information contained in the EIA Report; and in the methodology employed to examine all factors in the report.

20.3.2 Principal Bodies Consulted

The principal **bodies consulted,** who engaged with the EIA Report Team, included

- Tipperary County Council (Planning and Roads Departments)
- Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
- Development Application Unit (DAU)
- National Parks and Wildlife Service (NPWS)
- Inland Fisheries Ireland (IFI)
- Health Services Executive (HSE Naas)
- Irish Water
- Transport Infrastructure Ireland (Tii)
- Office of Public Works (OPW)
- National Federation of Group Water Schemes.

20.3.3 Public Consultation

As part of the public consultation for the Whole UWF Project which includes UWF Related Works, EDL held public consultation & information days in the following three venues (at the same time and date for all three venues); Kilcommon Community Centre; Rear Cross Community Centre and Lee's Bar, Newport on Tuesday 10th October, 2017 from 2pm to 8pm.

Members of the EIAR Team and representatives from Coillte (as one of the landowners along the cables route) were present to provide information, answer any questions and engage in consultation on the details and timing of the proposal.

20.3.4 On-going consultation

The planning application documents submitted to Tipperary County Council are available for inspection and purchase at Tipperary County Council's offices in Nenagh and also on the Tipperary County Council website.

In addition, all the application documents including this appeal will be available on the Applicant's dedicated project website at www.upperchurchwindfarm.ie. The project website also include details of the submission/observation procedure and contact details of the Applicant.

20.4 Summary of Chapter 4: Alternatives Considered

The consideration of alternatives is a requirement of Annex IV (2) of the EIA Directive and the single most effective means of avoiding significant environmental effects.

The final design of the UWF Related Works resulted from a process of consideration of reasonable and practicable alternative locations, alternative layouts, alternative processes and alternative mitigation measure, including alternatives for the construction and operation of the development. This process was carried out by the Project Design Team and the EIAR Team, during the design and initial environmental appraisal of the project and the chosen options were decided having regard to a comparison of the relevant environmental impacts of each option.

20.4.1 Alternative Locations

Different locations were examined and the location that was reasonably possible and that had the least effect on the environment was chosen.

20.4.1.1 Alternative Delivery Routes

Upperchurch Windfarm will be constructed on broadly 4 No. areas;

- (Turbines) T1 to T8 in the Shevry area, where there is access for construction traffic directly from the R503
- T9 to T16 in the Knocknameena Commons area, where there is access only from the Local Roads
- T17 to T21 in the Knockmaroe/Grousehall area, where there is access only from the Local Roads
- T22 and the windfarm substation at Knockcurraghbola Commons, where there is access only from the Local Roads.

Construction traffic to consented T9 upto T22 and the windfarm substation, which are not directly accessible from the R503, will require that Local Roads are used for access. Works will be required to upgrade these roads, in particular, to facilitate the abnormal loads needed for turbine components. Alternative Local Road delivery routes were investigated for this access and these routes were appraised for the general condition and capacity of the road including width; pavement strength; traffic use and water crossings.

Three Local Road sections were investigated;

- **Road A** - L4139-0.
- **Road B** - the eastern section of the L6188-0
- **Road C** - the L2264-50 and the western section of the L6188-0

Road A in combination with Road C was more favoured in comparison of environmental effects. Therefore this combination is proposed. Road A will be reached through the windfarm roads in the Shevry area (which have direct access from the R503) and will be used to access T9 to T16 in Knocknameena Commons. Road C (which is directly off the R503) will be used to access T17 to T22 and the windfarm substation. Road B will not be used for construction traffic.

The works required to upgrade the chosen routes are the Haul Route Works part of the Subject Application, to be carried out at 13 No. locations, called HW1 to HW13.

20.4.1.2 Alternative Turning Areas for Road C Selection

The Local Roads delivery routes thus chosen, consideration of alternative locations for access to Road C (Borrisoleigh Road), from the R503 were considered. Turbine components will come from the Thurles direction and the abnormal load lengths will not be able to make the right turn from the R503, onto Road C. A turning area is required west of the turnoff, so that the manoeuvre can be made 'straight on'.

2 No. alternative turning area locations were identified;

- **Turning Point 1:** Turning point from the R497 at Knockabansha, which is at an existing farm entrance.
- **Turning Point 2:** Turning point from the R503, which is at an existing entrance to a forestry yard.

The existing yard at Location 2 is the better choice when compared for environmental effects. Haul Route Works (HW 7) part of the Subject Application, is proposed for Location 2.

20.4.1.3 Alternative Location – Telecoms Relay Pole

There were two possible location options for the Telecoms Pole, both of which have line of sight to the Foilnaman and the Laghtseefin masts;

- **Location 1:** Top of Knockcurraghbola Crownlands.
- **Location 2:** Top of Knockmaroe.

Location 2 at Knockmaroe offers more mitigating environmental effects due to the easy access and also a readily available power source, negating the need to build a low voltage overhead line to provide power. Location 2 is therefore the chosen site for the Telecoms Relay Pole.

20.4.2 Alternative Layouts

Alternative layouts can often be devised to consider how different elements of a proposal can be arranged on a site typically with different environmental, as well as design, implications.

20.4.2.1 Alternative Layout – Internal Windfarm Cables

Internal cabling is required to connect the wind turbines to the windfarm substation.

There were two possible layout options;

a. **Layout A:** Laid in the local roads whenever possible.
b. **Layout B:** Laid in agricultural and forestry lands with road crossings only.

Both layouts were evaluated as having the same environmental effect, but it was considered that cabling works along the Local Roads, Layout A, would cause considerable inconvenience to road users and, because there is an alternative to using the roads - Layout B, the cross-country option using agricultural and forestry lands with road crossings was chosen.

20.4.2.2 Alternative Layout – Realigned Windfarm Roads

Since planning permission was granted for Upperchurch Windfarm, on-going pre-construction site investigations and landowner consultations indicated that alternative layouts should be considered for 2 no. lengths of already consented windfarm roads. Alternatives were examined for realigning some parts of the already consented windfarm roads.

Realigned Windfarm Road - RWR1 will be shorter at 230m in length than the already consented road and is through forestry, which will require forestry felling of 0.26ha.

The consented road between Turbine No.19, Turbine No. 20 and Turbine No. 21 is 840m long in total. It is proposed to replace 370m of this road by RWR2, for the same length of 370m, 150m of which is on existing farm road. It was the landowner's preference that the alternative of using an existing farm track would be considered to reflect changes to farming practices on his farm.

These alternative layouts are part of the Realigned Windfarm Roads in the Subject Application.

20.4.3 Alternative Process

The processes associated with the construction and operation of UWF Related Works, were identified by the Design and EIAR evaluation teams and also through consultation with interested parties. Consideration of alternative process at the earlier stages in the evolution of a project represent significant potential for avoidance of adverse effects on the environment. An examination of the project processes, resulted in alternative processes being devised to avoid, prevent or reduce environmental effects. These alternative processes are an intrinsic part of the design of the UWF Related Works. In summary alternative processes were devised for

- Timing of the construction works to avoid in-combination effects of dust and noise on Local Residents and sedimentation effects on water.

- Controls on refueling, overnight parking; and use of cementitious material, to avoid contamination of groundwater, water and soils.
- Control of location and treatment of stockpiled soils, to control sedimentation effect.
- Seasonal timing of works in relation to disturbance to badger and hen-harrier.
- Considerations of bat-crossings to avoid habitat fragmentation and control of lighting to avoid disturbance to bats.
- Identification of built services before digging, to avoid damage and loss of service through accidental severance.
- Control of access and egress at temporary site entrances to minimise removal of roadside boundaries and hedgerows.
-

20.4.4 Alternative Mitigation Measures

Mitigation measures were identified by the Design and EIAR evaluation teams and also through consultation with specialist bodies. An examination of these measures, resulted in an alternative measure being devised to refine the mitigating environmental effect on Cultural Heritage which is summarised as

- To mitigate loss or damage to Cultural Heritage all initial groundworks will be supervised by an archaeologist rather than near known sites only.

20.4.5 'Do-Nothing' Alternative

The 'do-nothing' alternative for this project would result in;

- Lost opportunity for economic activity during construction of UWF Related Works.
- Possible consequential opportunity cost to economic activity from the loss of construction and operation of Upperchurch Windfarm and UWF Grid Connection.
- Ireland has signed up to several Climate agreements including the "2030 Climate and Energy Policy Framework" which aims to reduce GHG emissions by 40% compared with 1990 levels by 2030. In the 'do-nothing' alternative there could be a consequential loss of the carbon offset potential from the generation of 150 million kWh of renewable energy per annum if Upperchurch Windfarm is not built. Upperchurch Windfarm will avoid the emission of 128,118 tonnes of greenhouse gases per annum which would result from generating the same amount of electricity by fossil fuel plant. This generation may or may not be realised at another renewable energy plant.
- If Upperchurch Windfarm is not built, Ireland is less likely to meet the target of 40% electricity generation to come from renewable sources by 2020 as set out in the National Renewable Energy Action Plan (NREAP).

20.5 Summary of Chapter 5: Description of the Development

20.5.1 UWF Related Works: Location and Characteristics

The **UWF Related works comprises** of the following:

Internal Windfarm Cabling of c. 17.9km in length, to connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables within ducts in trenches 1.25m deep and 0.6 wide. The majority (11.1km) of the Internal Windfarm Cabling will be installed under Consented Windfarm Roads or Realigned Windfarm Roads. The remainder of the Internal Windfarm Cabling will be installed in agricultural lands (4.6km), forestry lands (2.1km and forestry felling of 0.1ha), and crossing under 9 No. public roads (40 meters). The cabling will traverse the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin.

The Internal Windfarm Cabling consists of electrical cables and communication cables and the copper conductor cables which are installed inside High Density Polyethylene (HDPE) ducting in underground trenches. The trench will be excavated, ducting and warning tapes installed and trench backfilled and reinstated. When the ducting installation is finished and the trench reinstated, the electrical, communication and copper conductor cables will then be pulled through the ducting. The only surface expression of the Internal Windfarm Cabling will be the over-ground identification marker posts and marker plates which will be installed at regular intervals above the cables trench

Realigned Windfarm Roads to realign the consented UWF Windfarm Roads at three locations;

The consented windfarm road to Turbine No.5 in Shevry is 560m in length, and will replace this road in its entirety with a new road 230m in length through forestry. This will require forestry felling of 0.2ha.

The consented windfarm road between Turbine No.19, Turbine No. 20 and Turbine No. 21, is 840m in length. It will replace 370m of this road with a new road also 370m in length. 220m of this road will be located on grassland field, with the remaining 150m in length located on existing farm road. The existing farm road section will be upgraded during construction works.

A short length (30m) of new access road is between the consented windfarm roads in Knockmaroe to the new Telecom Relay Pole.

Haul Route Works are along public road verges, roadside boundaries and grassland fields in order to widen parts of the L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 by between 0.5m and 1.5m and to widen an entrance off the R503 by 30m. These works will facilitate the delivery of turbine components to the Upperchurch Windfarm site and will take place in the following townlands: Shevry, Knockcurraghbola Commons, Knocknabansha, Knockmaroe and Grousehall. Works include the removal of soils and laying of crushed stone and hard-core in 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.

The **Telecom Relay Pole** will relay communication signals around the Consented UWF Turbines in order to avoid interference from the operating Upperchurch Windfarm. The Telecom Relay Pole will comprise a wooden pole, up to 18m in height, with relay equipment attached to the top of the pole. A small compound, 5m X 5m in size, will enclose the relay pole, along with a ground based outdoor cabinet 2m high, 1.2m long and 1m wide and ancillary equipment. The compound will be securely fenced with 2.4m high palisade fencing; a native hedgerow will be planted on the berm created from the excavations. A communications and

low voltage (LV) electricity supply will be cabled to the compound, from the existing supply at the Foilnaman mast, by 300m in length of cabling.

RW Ancillary Works will facilitate the construction of the UWF Related Works and will include a change of use for and existing agricultural entrance to agricultural and forestry entrance in permanent use, and 14 No. temporary site entrances; 5300m of temporary access roads; temporary and permanent watercourse crossings, involving 24 No. small field drains and 8 no. streams; drainage systems around permanent features and temporary drainage around works areas; 0.3 hectares of forestry to be felled; temporary and permanent hedgerow/tree removal; temporary and permanent fencing, temporary goal posts and bat crossing structures; relocation of 5 No. existing telephone poles; 11,830m^3 of material will be excavated and temporarily stored for subsequent reinstatement or permanently placed in berms; reinstatement of roadside boundaries and public road surfaces.

20.5.2 UWF Related Works: Construction & Operation

20.5.2.1 UWF Related Works Construction Phase

All elements of the whole UWF project will be constructed at the same time and is expected to commence 2018/2019 and will take approx. 12 months. 5 of the c.100 persons working directly on the Upperchurch Windfarm site will work on UWF Related Works. A specialist communication engineering crew, made up of c. 2 personnel, will be involved in the erection and set up of the Telecom Relay Pole. The UWF Related Works, 23 No. loads of concrete and 292 No. loads of aggregate will be transported to the site by HGV, from local suppliers. A further 2 No. loads of road surfacing material and 43 No. loads of specific building materials will also be imported to the site, from various suppliers in the Region.

20.5.2.2 UWF Related Works Operational Phase

UWF has been granted permission to operate for 25 years from the date of commissioning. UWF Related Works will operate for the same period as the windfarm. The personnel employed in O&M for the windfarm will also maintain the UWF Related Works.

20.5.2.3 UWF Related Works use of Natural Resources

20.9 hectares of land within the full UWF Related Works construction site which is reduced to just 25m^2 around the Telecom Relay Pole compound, during the operational phase; 4750m^3 of topsoil, 6670m^3 of subsoil and 360m^3 of rock will arise from excavation works; small amounts of potable and non-potable water will be imported onto the site as required; 170m of hedgerow and 4 No. trees will be removed and the equivalent amount replanted following construction.

20.5.2.4 UWF Related Works Emissions

Insignificant dust, construction machinery exhaust, noise, vibration and light will be emitted during the **Construction Stage**. During the **Operational Stage** there will be negligible dust, vehicle exhaust, noise, vibration and light emitted. The operational electrical plant will be a source of electromagnetic fields but these will not be at levels to cause significant effects.

20.5.2.5 UWF Related Works Waste

UWF Related Works personnel will use the welfare facilities and waste facilities provided at the Windfarm Site Compound No. 1 and No. 2. At these facilities, waste water will be contained in self-contained units and emptied by a licenced facility or, in the case of the Site Offices, will be treated in the existing septic tank. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at Site Compound No.1 and collected by an appropriately licensed waste contractor. There will be minimal general and chemical waste during the **Operational Stage**. This waste will be stored in a designated and secure area at the windfarm site offices and collected by an appropriately licenced operator. Welfare facilities for the O&M crew will be provided at the windfarm site offices. Any wastes which result from the construction, operation and decommissioning of UWF Related Works will be managed under the Waste Management Plan for the operating UWF.

20.5.3 Vulnerability of UWF Related Works to Major Accidents and/or Disasters

The UWF Related Works **is not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during construction and operation. Furthermore there are no Seveso sites in proximity to the UWF Related Works site.

It is considered that the UWF Related Works is not vulnerable to natural disasters such as land slippage, due to the absence of peat or very shallow peats at the works locations. Therefore it is considered that the likelihood of land slippage disaster occurring along the UWF Related Works is **Extremely Unlikely**.

A flood risk assessment was carried out by Hydro Environmental Services (HES), who conclude that there is a low risk of because, based on the Preliminary Flood Risk Assessment Maps (PFRA) all of the works areas and infrastructure are located in mapped Flood Zone C (Low Risk) – where the probability of flooding is low (less than 0.1% or 1 in 1,000). The elevated nature of the UWF Related Works areas means no significant pluvial or fluvial flooding would be expected. Also, there will be no potential of increased local flood risk as a result of the UWF Related Works as most of the subject development is located underground (i.e. windfarm cabling). The footprint of the above-ground permanent infrastructure (i.e. realigned windfarm access roads, relay pole base etc) is minimal and distributed over several catchments and all new permanent watercourse crossing culverts will be suitably designed to accommodate flood flows.

Therefore it is considered that the likelihood of flooding disaster affecting the UWF Related Works areas is **Unlikely.**

20.6 Summary of Chapter 6: Population

UWF Related Works is located in County Tipperary. The surrounding area is rural with isolated residences and farmsteads scattered throughout the area. Nearby settlements include the villages of Upperchurch and Kilcommon.

The Sensitive Aspect of Population which was evaluated in this topic chapter is the Local Economy.

UWF Related Works was evaluated for potential to cause impacts to Population as a result of spending and job demand in the Local Economy.

20.6.1 Summary of UWF Related Works Impacts

- Impacts to the Local Economy will be Imperceptible Positive, when considered in the context of the value of the Local Economy.

20.6.2 Summary of UWF Related Works Cumulative Impact

- Cumulative impacts to the Local Economy will be Slight Positive, due to the combined spend and labour demand of the UWF Related Works and Upperchurch Windfarm.

20.6.3 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 with these Other Elements, in particular Upperchurch Windfarm and UWF Grid Connection, was also examined.

- In summary, cumulative effects to the Local Economy due to combined spending and jobs in the local economy, will be positive and imperceptible.

20.6.4 Summary of Cumulative Impacts with Other Projects or Activities

Bunkimalta Windfarm, was also evaluated for cumulative effects in this topic chapter as it is both at a sufficient scale to contribute to cumulative impacts and it also has potential to be constructed during the same period as the Whole UWF Project.

- Positive Cumulative effects to the Local Economy due to the combined spend and labour demand of the UWF Related Works and the Other Elements of the Whole UWF Project and the Bunkimalta Windfarm, will be Imperceptible, when considered in the context of the value of the Local Economy.

20.7 Summary of Chapter 7: Human Health

Health is determined not only by the local environment, access to quality healthcare services and lifestyle choices but also by the social and economic conditions in which people live. The Human Health chapter investigates and assesses the likelihood of significant effects directly attributable to the development and draws from and builds upon, the conclusions of the other chapters most notably Chapter 6: Population, Chapter 11: Water, Chapter 12: Air, Chapter 14: Material Assets (Built Services) and Chapter 15: Material Assets (Roads).

UWF Related Works is located in the Mid-West region within North Tipperary. North Tipperary performs marginally worse than the national average for the majority of health status indicators. However, mental health indicators such as "deliberate self-harm", those diagnosed with a "psychological or emotional condition", and "deaths from respiratory disease" all perform better in North Tipperary compared to the national average.

Sensitive Aspects evaluated in this topic chapter include Local Residents & Community and Transient People (walkers/cyclists, road users, farm/forestry workers etc.).

20.7.1 Summary of UWF Related Works Impacts

- Positive Imperceptible impacts to Local Residents & Community are expected as a result of cross-factor positive effects to the local economy through increased employment opportunities during the construction stage. Increased employment can positively influence health by supporting job security; and represents a positive contribution to socio-economic health determinants.
- No adverse cross-factor health impacts are likely to occur to Local Residents & Community or Transient People.

20.7.2 Summary of UWF Related Works Cumulative Impact

- Slight positive cumulative impacts to Local Residents & Community are expected as a result of cross-factor positive effects to the local economy through combined increased employment opportunities during the construction stage from UWF Related Works and Upperchurch Windfarm.
- No adverse cross-factor cumulative health impacts are likely to occur to Local Residents & Community or Transient People.

20.7.1 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 with these Other Elements, in particular Upperchurch Windfarm and UWF Grid Connection, was also examined.

- No cumulative adverse health effects are expected.
- Cumulative positive effects to Local Residents & Community due to combined increased employment, are expected to be of Slight significance.

20.7.2 Summary of Cumulative Impacts with Other Projects or Activities

Bunkimalta Windfarm, was also evaluated for cumulative effects in this topic chapter as it is both at a sufficient scale to have measurable cumulative impacts and it also has potential to be constructed during the same period as the Whole UWF Project.

Cumulative positive effects to Local Residents & Community, of the UWF Related Works, together with the Other Elements of the Whole UWF Project (UWF Grid Connection and Upperchurch Windfarm) and the Bunkimalta Windfarm, are expected to be Imperceptible in the context of the size of the Population in this upland area.

20.8 Summary of Chapter 8: Biodiversity

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. Although UWF Related Works will not effects National Sites, this Sensitive Aspect was also included in the evaluation in order to show the totality of the project by presenting the effects of the Other Elements of the Whole UWF Project (limited to UWF Grid Connection).

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.

20.8.1 Summary of Effects on European Sites

In relation to European Sites, it was concluded in the NIS (See Volume E), that in light of the conservation objectives and rationale for designation of the European Sites under consideration (Slievefelim to Silvermines SPA, Lower River Shannon SAC and Lower River Suir SAC); the potential for significant effects exists as a result of a single project element of the Whole UWF Project, namely the UWF Grid Connection. However, with the implementation of the Project Design Measures and the Additional Mitigation Measure AMM-01 in respect of Otter, it is concluded that neither the UWF Grid Connection, nor any Other Element of the Whole UWF Project, alone or in combination with each other or with Other Projects or Activities, will result in any effects that will adversely affect the integrity of the European Sites.

This NIS is included in Volume E: Appropriate Assessment Reporting.

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

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 Slight-Moderate,
- Impacts to Terrestrial Habitats will be Not Significant in relation to reduction of habitats, hedgerow severance or loss of high nature value trees, as a consequence of the development of UWF Related Works.
- Adverse impacts to the Hen Harrier will be Slight as a consequence of UWF Related Works.
- 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 Neutral.
- 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.

20.8.3 Summary of UWF Related Works Cumulative Impact

20.8.4 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.

- In-combination impacts to Aquatic Habitats & Species will range from Slight to Moderate.
- In-combination adverse impacts to Terrestrial Habitats will not be of a greater significance than for the UWF Related Works on it owns, - i.e. cumulatively Not Significant in relation to habitat reduction or hedgerow severance. However, due to the planting of trees associated with the Upperchurch Hen Harrier Scheme (UWF Other Activities) cumulative effects of all Elements of the Whole UWF Project will change from Not Significant adverse to Moderate and positive in relation to habitat enhancement effects to Terrestrial Habitats.
- In-combination impacts to Hen Harrier will change from 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).
- 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 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.

20.8.5 Summary of Cumulative Impacts with Other Projects or Activities

The cumulative impact with Other Projects or Activities relates to the in-combination effect of all Elements of the Whole UWF Project (in particular UWF Grid Connection, and to a lesser extent UWF Related Works, Upperchurch Windfarm, UWF Replacement Forestry and UWF Other Activities) with the consented projects - Bunkimalta Windfarm, Castlewaller Windfarm, Newport Distributor Road, and the activities- Forestry, Agriculture and Turf-Cutting.

- Cumulative impacts of the Other Elements of the Whole UWF Project to Aquatic Habitats & Species only relates to UWF Grid Connection, which together with Bunkimalta Windfarm and Newport Distributor Road could cause cumulative reductions in aquatic habitat quality and are evaluated as cumulatively Slight for the Clare River catchment and cumulatively Slight to Moderate for the Newport (Mulkear) River catchment. No other cumulative impacts with other projects are expected.
- Cumulative impacts to Hen Harrier will be Neutral, when the consented Bunkimalta Windfarm and Castlewaller Windfarm and forestry activities are considered in-combination with the Whole UWF Project.
- Cumulative impacts to General Bird Species is limited to cumulative habitat loss effects to Meadow Pipit and cumulative habitat enhancement effects to general birds, as a result of the cumulative effects of

Bunkimalta Windfarm. Cumulative effects will not be greater than for the cumulative Whole UWF Project – i.e. Slight adverse and Slight positive cumulative effects.

- Cumulative impacts to Marsh Fritillary with Other Projects or Activities have potential to be Moderate adverse at a wider county-level population scale when Turf-Cutting activities in Cummer Bog were taken into account.
- No cumulative impacts of any Element of the Whole UWF Project with Other Projects or Activities are expected to National Sites, Terrestrial Habitats, Bats, Non-Volant Mammals or Amphibians & Reptiles.

The authors conclude that **no significant adverse effects to Biodiversity are likely to occur** as a result of the development of the UWF Related Works, either alone or in combination with Other Elements of the Whole UWF Project or Other Projects or Activities.

20.9 Summary of Chapter 9: Land

The UWF Related Works is located in the rural countryside in County Tipperary, where the dominant landuse within the site boundary is agriculture. Within the wider Slievefelim to Silvermines upland area, both agriculture and forestry are the predominant landuses.

Sensitive Aspects of Land which were evaluated in this topic chapter include Agricultural Land and Forestry Land.

Environmental Protection Measures were incorporated into the project design to minimise damage to lands and to ensure best practice during land reinstatement. Best Practice Measures will also be implemented during construction works in relation to landowner liaison and to further minimise disturbance to or damage to lands.

The main effects to both Agricultural Lands and Forestry lands relates to a loss of connectivity between parcels of lands due to the presence of works and associated works area boundaries, and the temporary loss of use of the lands within construction works areas during construction works and for a short period afterwards until the works areas have re-vegetated.

20.9.1 Summary of UWF Related Works Impacts

- Impacts to Agricultural Land will be Neutral,
- Adverse impacts to Forestry Land will be Imperceptible.

20.9.2 Summary of UWF Related Works Cumulative Impacts

- Cumulative Impacts to the Agricultural Land (Neutral) and Forestry Land (Imperceptible), due the small scale (1%) of lands subject to works, in the context of the size of landholdings, the temporary duration and reversibility of the impact with the completion of the works, and the alternative access available on the landholdings.

20.9.3 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 (in particular UWF Grid Connection and Upperchurch Windfarm).

- Cumulative impacts to Agricultural Land and Forestry Land of UWF Grid Connection together with the Other Elements of the Whole UWF Project will not be greater than Imperceptible.

20.9.4 Cumulative Impacts with Other Projects or Activities

There is no potential for cumulative effects with Other Projects or Activities.

20.10 Summary of Chapter 10: Soils

Soils relates to topsoil, subsoil and bedrock. UWF Related Works will be predominately located on agricultural lands. Soils in the area comprise mainly mineral or organic (peaty) topsoil over glacial tills. The underlying bedrock in the study area mainly comprises volcanic meta-sediments. Soils in the UWF Related Works study are not designated.

Sensitive Aspects of Soils which were evaluated in this chapter include Local Soils, Subsoils & Bedrock; Bleanbeg Bog NHA and Lower River Shannon SAC. The evaluation of effects to Bleanbeg Bog NHA and the Lower River Shannon SAC relate to effects caused by another Element of the Whole UWF Project – the UWF Grid Connection.

20.10.1 Summary of UWF Related Works Impacts

- Adverse impacts to Local Soils, Subsoils & Bedrock will be Slight-Moderate in relation to excavation/re-location of soils, and Imperceptible in relation to erosion, compaction and contamination effects.
- There is no potential for UWF Related Works to cause impacts to the Lower River Shannon SAC as the construction works areas are not located within the SAC boundary, with a separation distance of 1.5km.
- There is no potential for UWF Related Works to cause impacts to the Bleanbeg Bog NHA as the construction works areas are not located within the NHA boundary, with a separation distance of 13km.

20.10.2 Summary of UWF Related Works Cumulative Impacts

- Adverse impacts to Local Soils, Subsoils & Bedrock cumulatively with Upperchurch Windfarm will be Slight-Moderate in relation to excavation/relocation of soils; Imperceptible in relation to compaction and erosion; imperceptible in relation to contamination by oils/fuels and no potential for cumulative effects from contamination by cement based products.
- There is no potential for UWF Related Works to cause impacts to the Lower River Shannon SAC as the construction works areas are not located within the SAC boundary, with a separation distance of 1.5km and therefore there is also no potential to cause cumulative effects.
- There is no potential for UWF Related Works to cause impacts to the Bleanbeg Bog NHA as the construction works areas are not located within the NHA boundary, with a separation distance of 13km, and therefore there is also no potential to cause cumulative effects.

20.10.3 Summary of Cumulative Impacts with the 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 (in particular the construction works relating to UWF Grid Connection and Upperchurch Windfarm).

- Cumulative impacts to Local Soils, Subsoils & Bedrock with the Other Elements will be Slight-Moderate in relation to soil excavation/relocation impacts, Slight in relation to potential contamination by cement-based compounds, and will remain cumulatively imperceptible in relation to erosion, compaction or fuel/oil contamination effects.
- No cumulative impacts to either the Lower River Shannon SAC or Bleanbeg Bog NHA, the only Element which will cause impacts to these sites is the UWF Grid Connection which could cause Imperceptible impacts to both of these sites.

20.10.4 Summary of the Cumulative Impacts with Other Projects or Activities

There is no potential for UWF Related Works to cause cumulative impacts to the Sensitive Aspects with Other Projects or Activities. Cumulative impacts with Other Projects or Activities only relates to cumulative impacts of the UWF Grid Connection together with the consented Castlewaller Windfarm and Turf-Cutting.

- Cumulative effects to Local Soils, Subsoils & Bedrock will be no greater than Imperceptible Adverse as a consequence of the UWF Grid Connection cumulatively with the consented Castlewaller Windfarm.
- No cumulative effects are expected to Bleanbeg Bog NHA as a consequence of the UWF Grid Connection cumulatively with turf-cutting activities.
- There is no potential for cumulative effects to the Lower River Shannon SAC with Other Projects or Activities.
- There is no potential for cumulative effects to the Lower River Shannon SAC with Other Projects or Activities.

20.11 Summary of Chapter 11: Water

UWF Related Works is mainly located within the River Suir (surface water) and Templemore A (groundwater) catchments, with the remainder of the project is located within the River Shannon (surface water) and Slieve Phelim (groundwater) catchments.

The construction of the UWF Related Works will involve crossing over 32 watercourses, and will include the construction of 9 new permanent crossing structures all of which are located within the catchment area for the Lower River Suir SAC.

The sensitive aspects of Water evaluated in this topic chapter include: Local Surface Water Bodies, Local Groundwater Bodies, Local Wells & Springs, Lower River Shannon SAC, Lower River Suir SAC and Local Water Dependent Habitats. Bleanbeg Bog NHA is included in this chapter in order to show the totality of the whole project, although UWF Replacement Forestry has no potential to effect this sensitive aspect.

A suite of environmental protection measures (18 no.) has been integrated into the project design to ensure that significant effects to the Water environment are avoided or reduced. In addition to the Project Design Measures, 11 Best Practice Measures 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 which will provide the framework for water quality protection at the site.

20.11.1 Summary of UWF Related Works Impacts

The likely adverse impacts to the individual Sensitive Aspects are outlined below:

- Adverse Impacts to Local Surface Water Bodies, as a consequence of the UWF Related Works, ranged from Imperceptible to Slight for all impacts except for impacts of earthworks with is Slight to Moderate,
- Adverse Impacts to Local Groundwater Bodies, Lower River Shannon SAC, Lower River Suir SAC or Local Water Dependent Habitats will be of no greater significance than Imperceptible.,
- Impacts to Local Wells & Springs are not likely to occur,
- There is no potential for the UWF Related Works to cause impacts to Bleanbeg Bog NHA.

20.11.2 Summary of UWF Related Works Cumulative Impacts

- Adverse cumulative impacts to Local Surface Water Bodies range from imperceptible to Slight for all impacts except for impacts of earthworks with is Slight to Moderate.
- Adverse cumulative Impacts to Local Groundwater Bodies, Lower River Shannon SAC, Lower River Suir SAC or Local Water Dependent Habitats will be of no greater significance than a range from No Impact to Imperceptible to Slight,
- Cumulative impacts to Local Wells & Springs are not likely to occur,
- There is no potential for the UWF Related Works to cause cumulative impacts to Bleanbeg Bog NHA.

20.11.3 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 (in particular UWF Grid Connection, Upperchurch Windfarm and UWF Replacement Forestry).

- In-combination impacts to Local Surface Water Bodies, ranged from Imperceptible to Slight-Moderate with the Other Elements of the Whole UWF Project.
- Cumulative Impacts to Local Groundwater Bodies, Lower River Shannon SAC or Lower River Suir SAC will be of no greater significance than Imperceptible,
- Cumulative Impacts of UWF Related Works with Upperchurch Windfarm to Local Water Dependent Habitats will be Slight.
- In relation to Bleanbeg Bog NHA, this sensitive aspect is in the locality of the UWF Grid Connection - Neutral impacts or No impacts are likely to Bleanbeg Bog NHA as a result of the UWF Grid Connection,

20.11.4 Summary of Cumulative Impacts with Other Projects or Activities

The cumulative impact with Other Projects or Activities relates to the in-combination effect of UWF Grid Connection, and to a lesser extent UWF Related Works and Upperchurch Windfarm, with Bunkimalta Windfarm, which is a consented project and could be constructed during the same period as these Whole UWF Project Elements.

- There is no potential for UWF Related Works to contribute to cumulative impacts to Local Surface Water Bodies. Cumulative impacts of the Other Elements of the Whole UWF Project only relates to UWF Grid Connection, which together with Bunkimalta Windfarm could cause imperceptible adverse impacts to Local Surface Water Bodies,
- Cumulative impacts of the Whole UWF Project Elements (UWF Related Works, UWF Grid Connection and Upperchurch Windfarm), with Bunkimalta Windfarm, to the Lower River Shannon SAC will remain cumulatively Imperceptible.
- There is no potential for cumulative impacts of any Element of the Whole UWF Project with Other Projects or Activities to Local Groundwater Bodies, Local Wells & Springs, Lower River Suir SAC, Bleanbeg Bog NHA or Local Water Dependent Habitats.

The authors conclude that **no significant adverse effects to Water are likely to occur** as a result of the development of the UWF Related Works, either alone or in combination with Other Elements of the Whole UWF Project or Other Projects or Activities.

20.12 Summary of Chapter 12: Air

UWF Related Works is located in a rural sparsely populated upland area in County Tipperary. The area has good air quality, and is considered to be a quite rural location with no major existing noise sources. Community facilities are concentrated in the nearby villages of Upperchurch and Kilcommon.

Local residents and members of the local community using community facilities, and transient people were evaluated as sensitive aspects of Air. Transient people relate to farm/forestry workers, road users and walkers/cyclists along roads or waymarked trails.

The construction of UWF Related Works will result in some dust and noise emissions. Measures have been designed into the project to avoid and reduce effects to Local Residents and members of the Community including limiting construction works to daytime hours only, and controlling the timing of construction works in the Knockmaroe and Knockcurraghbola Commons area to ensure that the UWF Related Works is not constructed at the same time as any other part of the Whole UWF Project in this area.

The operation of the UWF Related Works will result in increases in EMF in the area around the Internal Windfarm Cabling trenches. The calculation of the increase in ambient EMF levels was based on the maximum power output levels so that the worst-case possible levels of EMF were evaluated. Once operational, the actual levels of EMF will be recorded to confirm that levels of EMF as a result of the UWF Related Works either alone or in-combination are not greater than the levels reported in this EIA Report

20.12.1 Summary of UWF Related Works Impacts

- Adverse impacts to Local Residents & Community due to increases in ambient dust or noise levels is limited to the construction stage, and expected to be no greater than Slight or Moderate respectively.
- Adverse impacts to Local Residents & Community due to increased EMF emissions during the operation of the Internal Windfarm Cables will be no greater than Imperceptible.
- Neutral impacts or no impacts are expected to Transient People due to increases in ambient dust or noise levels.
- Adverse impacts to Transient People due to increased EMF emissions are expected to be no greater than Imperceptible, under worst case scenario calculations.

20.12.2 Summary of UWF Related Works Cumulative Impacts

- Adverse cumulative impacts to Local Residents & Community due to increases in ambient dust or noise levels is limited to UWF Related Works, Upperchurch Windfarm and to a lesser extent UWF Grid Connection construction works and construction related haulage, and expected to be no greater than Slight or Moderate respectively.
- Adverse cumulative impacts to Local Residents & Community due to increased EMF emissions only relate to the Knockmaroe and Knockcurraghbola Crownlands area where 5 No. local residences are within 100m of both Internal Windfarm Cabling and the 110kV UGC. However the cumulative impact from the operational cables will be no greater than Imperceptible.
- Neutral impacts or no impacts are expected to Transient People due to cumulative increases in ambient dust or noise levels during construction because the duration of any effects will be momentary to brief in duration.
- Adverse impacts to Transient People due to a cumulative increased in EMF emissions during operation are expected to be no greater than Imperceptible, under worst case scenario calculations.

20.12.3 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 (in particular the UWF Grid Connection and Upperchurch Windfarm).

- The addition of UWF Grid Connection and Upperchurch Windfarm will not increase the impacts to Local Residents & Community, above the impact levels outlined above for the UWF Related Works on its own.
- Adverse cumulative impacts to Transient People due to combined increases in EMF emissions will be cumulatively Imperceptible in relation to the combined effects UWF Related Works with Upperchurch Windfarm, and cumulatively Imperceptible to Slight in relation to the UWF Related Works with UWF Grid Connection.

20.12.4 Summary of Cumulative Impacts with Other Projects or Activities

There is no potential for cumulative impacts of UWF Related Works with Other Projects and Activities.

The potential for cumulative impacts of the Whole UWF Project with Other Projects or Activities only relates to the in-combination effect of UWF Grid Connection with the existing 110kV and 220kV overhead lines in the Mountphilips/Coole area and the consented Castlewaller Windfarm, where cumulative impacts to Local Residents & Community or Transient People will not be greater than Imperceptible.

20.13 Summary of Chapter 13: Climate

Climate is defined as the average weather over a period of time. Climate change is a significant change in this average weather. Ireland has signed up to several Climate agreements including the "2030 Climate and Energy Policy Framework" which aims to reduce GHG emissions by 40% compared with 1990 levels by 2030. Under the EU Commission's Climate and Energy Package, Ireland is required to deliver a 20% reduction in non-ETS (Emissions Trading Scheme) greenhouse gas emissions by 2020 (relative to 2005 levels).

Windfarms will help in achieving Ireland's targets by supplying renewable energy to the Grid and reducing the use of fossil fuels for energy production. The UWF Related Works is one Element of the Whole Upperchurch Windfarm Project. The purpose of UWF Related Works is purpose is to support the construction of the renewable generator, the consented Upperchurch Windfarm.

20.13.1 Summary of UWF Related Works Impacts

- UWF Related Works has no potential to directly positively impact Climate through increasing renewable energy production - as the UWF Related Works itself will not generate renewable electricity.
- The UWF Related Works itself will cause Neutral impacts to Climate due to the very small scale of emissions which will mainly arise as a result of the construction stage, and the very small amount of forestry felling required to develop the project.

20.13.2 Summary of UWF Related Works Cumulative Impacts

- UWF Related Works will cause Neutral impacts to Climate by itself, and therefore cannot have a cumulative effect.
- The UWF Related Works itself will cause Neutral impacts to Climate due to the very small scale of emissions which will arise during the construction stage, and the very small amount of forestry felling required to develop the project and therefore cannot have a cumulative effect.

20.13.3 Summary of the Cumulative Impacts of the 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 cumulative impacts of the Other Elements of the Whole UWF Project are summarised here to show the totality of the whole project.

- With the exception of Upperchurch Windfarm the Other Elements (UWF Grid Connection, UWF Replacement Forestry or UWF Other Activities) will also have Neutral effects on Climate.
- The Upperchurch Windfarm element will cause Slight positive effects to Climate due to the production of renewable energy during its lifetime.
- As only one Element can cause effects, there is no potential for cumulative effects of the Elements with each other.

20.13.4 Summary of the Cumulative Impacts with Other Projects or Activities

The cumulative impact with Other Projects or Activities only relates to the in-combination effect of the consented Upperchurch Windfarm with Other Operational Windfarms in the Republic of Ireland.

- There is no potential for UWF Related Works to contribute to cumulative effects with Other Projects or Activities.
- Cumulative positive impacts to Climate **in relation to meeting Ireland's 2020 targets** of the Upperchurch Windfarm with the other operational windfarms in the Republic of Ireland will be **Significant Positive.**

20.14 Summary of Chapter 14: Material Assets (Built Services)

Built Services relate to the pipes, overhead lines, underground cables and wireless signals which supply drinking water, electricity, telephone and broadband services to houses, businesses and community facilities.

Sensitive Aspects which were evaluated in this topic chapter include Local Residents & Community who are the end users of Built services, and the Electricity Transmission System which consists of the 110kV and 220kV electricity networks.

In relation to Local Residents & Community, due to the upland nature of the study area, end-users of Built Services such as local residences are widely dispersed and are generally located at the end of the water, electricity and telephone networks. Community facilities are mainly located in villages such as Kilcommon and Upperchurch.

The construction works associated with UWF Related Works will include the use of large machinery and the excavation of trenches in close proximity to both overhead lines and underground services. Project Design Measures will be implemented during construction works to minimise the likelihood of damage occurring to Built Services, through the use of goal posts, supervision, confirmatory surveys, and working during daylight hours.

In relation to the Electricity Transmission System, the UWF Related Works does not include any 110kV electrical parts, neither is UWF Related Works connected to or located near any transmission system assets.

20.14.1 Summary of UWF Related Works Impacts

- No impacts (loss of service due to damage) are likely to occur to Local Residents & Community as a consequence of the construction of the UWF Related Works.
- There is no potential for impacts to occur to the Electricity Transmission System as a consequence of the UWF Related Works, as the absence of electrical parts and interaction with the transmission system assets.

20.14.2 Summary of UWF Related Works Cumulative Impacts

- No impacts (loss of service due to damage) are likely to occur to Local Residents & Community as a consequence of the construction phase of the UWF Related Works, Upperchurch Windfarm and UWF Grid Connection (which will be concurrent).
- UWF Related Works has no potential to cause impacts to Electricity Transmission System by itself, and therefore cannot have a cumulative effect.

20.14.3 Summary of Cumulative Impacts with the 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 cumulative impacts of the Other Elements of the Whole UWF Project are summarised here to show the totality of the whole project.

- The UWF Related Works will not contribute to cumulative effects.
- As each of the Other Elements will cause either no impacts or neutral impacts to Local Residents & Community or the Electrical Transmission System, there is no potential for cumulative impacts with each other.

20.14.4 Summary of Cumulative Impacts with Other Projects or Activities

There is no potential for either UWF Related Works or the Other Elements to cause cumulative impacts to either Local Residents & Community or the Electrical Transmission System with Other Projects or Activities.

20.15 Summary of Chapter 15: Material Assets (Roads)

UWF Related Works is located in the vicinity of the Upperchurch Windfarm, and involves both works on lands within the Upperchurch Windfarm site for the Internal Windfarm Cabling, Realigned Windfarm Roads and Telecoms Relay Pole, and works along the public road network for the Haul Route Works and to provide temporary access to the Internal Windfarm Cabling locations.

Sensitive Aspects evaluated in this topic chapter include Public Roads and Road Users.

The main volume of traffic associated with UWF Related Works will occur during its construction, negligible traffic volumes are associated with the operational or decommissioning stages.

Access to works locations will be through the consented windfarm entrances off the R503 Regional Road and then via local roads to the various site access points. All of these roads are lightly trafficked and not congested.

During the construction stage, in order to facilitate the construction of Internal Windfarm Cabling and the construction of Haul Route Works there will be a total of 14 temporary access points from the local road network. There will also be road works at a number of locations which will involve the widening of the road at 13 locations, and the excavation of a trench for Internal Windfarm Cabling at 9 road crossing locations.

All roads damaged by the UWF Related Works construction traffic and road works will be repaired, with full width surface dressing laid along weaker sections of the public road.

20.15.1 Summary of UWF Related Works Impacts

- Adverse impacts to Public Roads, as a consequence of the UWF Related Works, will be Imperceptible for both damage to road boundaries and damage to road pavements.
- Adverse impacts to Road Users, as a consequence of the UWF Related Works, relate to increased journey times, and due to the lightly trafficked nature of the roads in the area, along with the available capacity on the roads and the temporary nature of the construction stage, effects are expected to be Imperceptible.

20.15.2 Summary of UWF Related Works Cumulative Impacts

- Adverse cumulative impacts to Public Roads, as a consequence of the construction stage of UWF Related Works and Upperchurch Windfarm, will be Slight in relation to removal of roadside boundaries and will be Imperceptible for cumulative damage to road pavements.
- Adverse cumulative impacts to Road Users, as a consequence of additional construction related traffic on local roads for deliveries to Upperchurch Windfarm and UWF Related Works construction works areas and on the R503 for Upperchurch Windfarm, UWF Related Works and UWF Grid Connection deliveries. The cumulative impacts are expected to be Imperceptible to Slight.

20.15.3 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 (in particular the construction traffic relating to Upperchurch Windfarm and UWF Grid Connection).

- Cumulative impacts to Public Roads and Road Users, as a consequence of the UWF Related Works with the Other Elements of the Whole UWF Project, will range from cumulatively Imperceptible to Slight.

20.15.4 Summary of Cumulative Impacts with Other Projects or Activities

There is no potential for cumulative effects with Other Projects or Activities.

20.16 Summary of Chapter 16: Cultural Heritage

The UWF Related Works is located on the eastern slopes of the Slievefelim – Silvermine Mountain uplands area. The Slievefelim to Silvermine Mountains upland area is a region with a rich and diverse history of human settlement going back to prehistoric times. This extended period of occupation is reflected in the archaeological record, with numerous known monuments recorded on the Record of Monuments and Places within the upland area.

Sensitive Aspects of Cultural Heritage, examined in this topic chapter, include Recorded Legally Protected Sites (sites listed on the RMP); Other Recorded sites (sites listed on the NIAH); Previously Unrecorded Sites (sites shown on historic Ordnance Survey mapping) and Unrecorded Subsurface Sites (currently undiscovered but potentially existing under the ground surface).

Within the study area for the UWF Related Works, a total of 65 Cultural Heritage Sites were identified and described. These included 24 No. Recorded Legally Protected Sites listed on the Record of Monuments and Places (RMP); and 41 Previously Unrecorded Sites shown on various editions of the historic Ordnance Survey maps which primarily consisted of wells, lime kilns, gravel pits and quarries etc.

Test excavations were carried out at 1 RMP Site, in Knockcurraghbola Commons townland, where the Internal Windfarm Cabling is routed through the zone of notification of a Recorded Legally Protected Site. Nothing of archaeological significance was recorded in the test trenches at this locations.

The UWF Related Works was evaluated for potential to damage cultural heritage sites during initial groundworks in the construction stage. The Telecom Relay Pole was evaluated for potential to cause visual impacts during its operation.

Project Design Measures will be implemented during construction works, these include the archaeological monitoring of groundworks, and the use of flagmen at temporary site access points rather than providing sightlines through the removal of roadside boundaries, some of which are also townland boundaries.

20.16.1 Summary of UWF Related Works Impacts

- No impacts are expected to Recorded Legally Protected Sites as a consequence of construction stage groundworks.
- Due to its small scale and design of the Telecoms Relay Pole, the visual impacts to Recorded Legally Protected Sites are expected to be Imperceptible.
- As there are no Other Recorded Sites in the UWF Related Works Study Area, there is no potential for impacts to these Sites.
- The construction stage groundworks will cause the removal of small sections of townland boundaries, mainly along the route of Internal Windfarm Cabling. Adverse impacts to Previously Unrecorded Sites are expected to be no greater than Slight.
- Any damage to Unrecorded Subsurface Sites is expected to be no greater than Slight, this is due to the monitoring of all works, and in the context of agricultural and forestry landuses in the works areas.

20.16.2 Summary of UWF Related Works Cumulative Impacts

- No cumulative impacts are expected to Recorded Legally Protected Sites as a consequence of construction stage groundworks of UWF Related Works and other works in the area i.e Upperchurch Windfarm and UWF Grid Connection due to separation distance from these Sites.
- The cumulative visual impacts to Recorded Legally Protected Sites, of the Telecoms Relay Pole with other Telecoms Masts in the area will be negligible and with the Consented UWF turbines and operating Milestone WF turbines will not have a greater magnitude of impact than the cumulative impact of these structures themselves.
- As there are no Other Recorded Sites in the UWF Related Works Study Area, the project has no potential to cause impacts by itself and therefore cannot have a cumulative effect.
- The construction stage groundworks will cause the removal of small sections of townland boundaries, mainly along the route of Internal Windfarm Cabling and at townland boundary crossing points for Upperchurch Windfarm. Adverse impacts to Previously Unrecorded Sites are expected to be no greater than Slight due to the scale of the works and previous alterations to these boundaries.
- There is expected to be no cumulative damage to Unrecorded Subsurface Sites as damage to these can only occur during initial ground works and not subsequent.

20.16.3 Summary of Cumulative Impacts with the 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 (in particular the UWF Grid Connection and Upperchurch Windfarm).

- In relation to Recorded Legally Protected Sites, the cumulative visual impact caused by the Telecom Relay Pole (UWF Related Works) cumulatively with the Consented UWF Turbines, is considered Not Significant.
- Cumulative effects with the Other Elements are limited to Previously Unrecorded Sites, where 2 townland boundaries will be effected by both the UWF Related Works and the UWF Grid Connection, and 2 other townland boundaries will be effected by both the UWF Related Works and Upperchurch Windfarm works. Adverse cumulative impacts to Previously Unrecorded Sites, as a result of these three Elements, are expected to be no greater than Slight.
- There is no potential for cumulative construction stage impacts to Unrecorded Subsurface Sites as it is considered that a cultural heritage site will only be affected by the initial works.

20.16.4 Summary of the Cumulative Impacts with Other Projects or Activities

Cumulative impacts with Other Projects or Activities relates to cumulative impacts of the UWF Related Works together with Other Projects (Milestone Windfarm, Foilnaman Mast and Cummermore Communications Pole).

- Cumulative effects to Recorded Legally Protected Sites will be no greater than Imperceptible as a consequence of the UWF Related Works cumulatively with Other Projects.
- There is no potential for cumulative effects with Other Recorded Sites, Previously Unrecorded Sites or Unrecorded Subsurface Sites.

20.17 Summary of Chapter 17: The Landscape

UWF Related Works is located in a rugged rural upland comprising of moderate and steep sided valleys that are cloaked in a combination of forestry and agricultural grassland. The area is sparsely populated, closest settlements include the villages of Upperchurch and Kilcommon. There are also two scenic routes and three waymarked trails within the study area.

Sensitive Aspects of Landscape, examined in this topic chapter, include Landscape Character and Visual Amenity.

The UWF Related Works was evaluated for potential to cause impacts to Landscape as a result of any alterations or divisions of land cover and vegetative patterns, any reduction in rural tranquillity or landscape integrity due to an intensification of activity in the area, or any visual disharmony or clutter caused by the addition/loss of above ground features in the area.

Project Design Measures will be implemented during construction works, these include the use of flagmen at temporary site access points rather than providing sightlines through the removal of roadside boundaries, and the control of construction schedules in the Knockmaroe/Knockcurraghbola area to reduce the intensity of construction activity in that area.

20.17.1 Summary of UWF Related Works Impacts

- Adverse impacts to both Landscape Character and Visual Amenity will be Imperceptible.

20.17.2 Summary of UWF Related Works Cumulative Impacts

- Cumulative impacts to Landscape Character and Visual Amenity of UWF Related Works, Upperchurch Windfarm, UWF Grid Connection and UWF Replacement Forestry where they all occur together is considered Slight in relation to land cover and vegetation patterns; Imperceptible from an intensification of activity and no greater than Slight from alterations of land cover during the construction stage. Cumulative Impacts on rural tranquility during co-construction of UWF Related Works and Upperchurch Windfarm is considered Imperceptible.

- The cumulative effect on Landscape Character and Visual Amenity during the operating stage, is considered Imperceptible. UWF Related Works will not noticeably contribute to the integrity of rural landscape patterns and addition of visual features and therefore will not contribute to these effects from the operating Upperchurch Windfarm.

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

As the UWF Related Works is one part of the Whole UWF Project, the cumulative impacts with the Other Elements of the Whole UWF Project are summarised below.

- Cumulative impacts due to an intensification of activity will not be greater than Imperceptible, in relation to Landscape Character, and Slight-Imperceptible in relation to Visual Amenity. Cumulative landscape character impacts due to alterations of land cover will be no greater than Slight.

- During the operational stage, cumulative impacts of the UWF Related Works with the Other Elements will be Imperceptible.

20.17.4 Cumulative Impacts with Other Projects or Activities

- Cumulative effects of the Elements of the Whole UWF Project with Other Projects or Activities during the construction stage relates to Forestry and Agricultural activities. Cumulative impacts to either Landscape Character or Visual Amenity will be no greater than Slight.

- Cumulative effects of the Elements of the Whole UWF Project with Other Projects or Activities during the operational stage relates to the Milestone Windfarm (operational since 2018), and the existing Foilnaman Mast and existing Cummermore Communications Pole. Cumulative impacts to either Landscape Character or Visual Amenity will be Slight/Not Significant.

20.18 Interaction of the Foregoing

Interaction between the Environmental Factors relates to cross-factor effects. A cross factor effect occurs when the effect on one Environmental Factor causes an indirect effect on another Environmental Factor.

In Chapters 6 to 17, the potential for likely direct and indirect effects was evaluated. Cross-factor effects are indirect effects. Potential cross factor effects were identified during EIAR Team meetings and evaluated by the authors of the receiving environmental factor topic chapter.

In summary there are no effects on one Environmental Factor likely to cause significant indirect effects on another Environmental Factor.

20.19 Monitoring Arrangements

The monitoring arrangements will involve an Environmental Clerk of Works, monitoring and auditing the implementation of a suite of environmental protection measures – Project Design Measures, Best Practice Measures and Management Plans, which have been developed to avoid, prevent or reduce significant effects on the receiving environment.

To facilitate the monitoring and auditing, the environmental protection measures have been incorporated into the Environmental Management Plan (EMP) and listed as Environmental Commitments.

The current List of Environmental Commitments (below) will be updated post-consent, with any additional requirements of planning conditions or statutory bodies.

Table 20-1: List of Environmental Commitments for UWF Related Works

Environmental Commitment	Source	Implemented By: Construction Manager/Project Manager Env. Clerk of Works / Other
The Project Promoter is committed to implementing the **Project Design Measures** PD01 to PD43.	EIAR, Ch.5	Project Team and specialist environmental and engineering experts
The Project Promoter is committed to implementing the **Traffic Management Plan.**	EMP, Tab 3	Project Team
The Project Promoter is committed to implementing the **Surface Water Management Plan.**	EMP, Tab 4	Project Team Site Ecologist Site Hydrologist
The Project Promoter is committed to implementing the **Invasive Species Management Plan.**	EMP, Tab 5	Project Team Site Ecologist
The Project Promoter is committed to implementing the **Waste Management Plan.**	EMP, Tab 6	Project Team
The Project Promoter is committed to implementing **Best Practice Measures** RW-BPM-01 to RW-BPM-32.	EMP, Tab 7	Project Team Site Ecologist Site Hydrologist
The Project Promoter is committed to **monitoring** the development to check that the project is in practice, conforming to the predictions made in the EIA Report.	EIAR, Ch.5	Project Team and specialist environmental and engineering experts

Monitoring arrangements will concentrate on the construction stage, with some monitoring surveys continuing during the early operational stage (c. first 3 to 5 years of operation).

A Schedule of Monitoring Arrangements is included in full in Chapter 19 of this Revised EIAR.

The Project Promoter will contractually oblige the construction contractors to carry out the works in accordance with UWF Related Works EMP. This commitment will be monitored on the ground by a full time Environmental Clerk of Works and team of environmental experts.

Monitoring and auditing of the compliance with the operational stage Environmental Commitments, will be the responsibility of the Project Promoter for Upperchurch Windfarm. The work will be carried out by the Upperchurch Windfarm Environmental Manager.

20.20 Summary of UWF Related Works EIA Report

Ecopower Developments submitted an EIA Report with a planning application for UWF Related Works to Tipperary County Council. Both the application and this EIA Report are available for public viewing at the offices of Tipperary County Council, and on-line at www.upperchurchwindfarm.ie The planning application was submitted on 17/07/2018, FI was requested on 10/09/2018. Tipperary County Council Refused Permission on 10th January, 2019. The original May 2018 EIA Report has been revised for this appeal to An Bord Pleanála on the Tipperary County Council decision – to be called Revised EIA Report (EIAR).

The UWF Related Works project has not been changed in terms of location and characteristics for the Appeal to An Bord Pleanála.

The revisions to the May 2018 EIAR were necessary in order to take account of the Reason for Refusal by Tipperary County Council of UWF Related Works; the 2 No. Tipperary County Council Planner's Reports (dated 06/09/2018 and 10/01/2019); and the Submission to Tipperary County Council on UWF Related Works from NPWS dated 13.12.18.

The preparation of this EIA Report has been coordinated by Ecopower Developments Limited, and the evaluation of the effects on each of the Environmental Factors has been carried out by Competent Experts.

The information in this EIA Report includes:

- a description of the UWF Related Works including a description of the location, physical characteristics, construction and operational phase, use of materials and natural resources, expected emissions and wastes; the vulnerability of the UWF Related Works to major accidents/disasters; a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
- a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
- a description of the Environmental Factors - Population, Human Health, Biodiversity (including fauna and flora); Land; Soil; Water; Air including air quality, noise & vibration and electromagnetic fields; Climate; Material Assets including Built Services (electricity network, communication network, water supply infra-structure) and Roads; Cultural Heritage and Landscape - including a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the evolution thereof without the implementation of the UWF Related Works (baseline plus trends);
- a description of the likely significant effects of the project on the environment resulting from; the construction and existence of the UWF Related Works, the use of natural resources, emissions and wastes, the technologies and materials used, the risks due to major accidents or disasters or climate change, cumulative of effects with other existing or consented projects or activities (any existing environmental problems have been considered), and the impact on climate change. The description of the likely effects includes direct effects, and indirect, secondary, cumulative, cross-factor, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects;
- a description of the forecasting methods or evidence used during the topic evaluations, any difficulties in compiling the information, and any uncertainties involved in the appraisals;
- a description of monitoring arrangements during the construction and operational stages;
- a reference list detailing the sources used for the descriptions and assessments in this EIA Report; and
- a non-technical summary of the information presented in the EIAR Main Report.

The UWF Related Works is part of a whole project (Whole UWF Project), which also includes UWF Grid Connection, UWF Replacement Forestry, the Upperchurch Windfarm (already consented), and UWF Other Activities. This EIA Report takes account of the whole project.

It can be concluded that the UWF Related Works can be constructed and operated, while at the same time providing a high level of protection to the environment and human health.

The competent experts have concluded that **no likely and significant effects** will occur to any of the Environmental Factors, **as a result of the UWF Related Works either alone or in combination** with the Other Elements of the Whole UWF Project and with other existing or consented projects or activities.