

UWF GRID CONNECTION REFERENCE DOCUMENTS

UWF REPLACEMENT FORESTRY VOLUME F6: EIA 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 (EIA)	Volume C1: EIA Non-Technical Summary Volume C2: EIA Main Report Volume C3: EIA Figures Volume C4: EIA 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 F4: Environmental Management Plan For The UWF Related Works Volume F5 TO F7: 2018 UWF Replacement Forestry EIA Report <p style="text-align: center;">VOLUME F6: EIA MAIN REPORT (2 PARTS)</p> Volume F8 to F9: Upperchurch Windfarm <p style="text-align: right;">DETAILS OVERLEAF</p>

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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 Replacement Forestry (UWF Replacement Forestry)

UWF Replacement Forestry EIA Report (EIAR) VOLUME C2: EIAR MAIN REPORT (Part 2 of 2)

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REFERENCE DOCUMENTS

Table of Contents

ElAR Main Report Chapter No.	Chapter Title
Part 1 of 2	
Chapter 1	See Volume C2: ElAR Main Report (Part 1 of 2)
Chapter 2	
Chapter 3	
Chapter 4	
Chapter 5	
Chapter 6	
Chapter 7	
Chapter 8	
Chapter 9	
Chapter 10	
Part 2 of 2	
Chapter 11	Water
Chapter 12	Air
Chapter 13	Climate
Chapter 14	Material Assets (Built Services)
Chapter 15	Material Assets (Roads)
Chapter 16	Cultural Heritage
Chapter 17	Landscape
Chapter 18	Interaction of the Foregoing
Chapter 19	Monitoring Arrangements
Chapter 20	Executive Summary

REFERENCE DOCUMENTS

UWF Replacement Forestry EIA Report

Volume C2: EIAR Main Report

Chapter 11: Water

Topic Chapter Authors:



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Topic	Water
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Contents

11	Environmental Factor: Water	1
11.1	Introduction to the Water Chapter	1
11.1.1	What is Water?	1
11.1.2	Overview of Water in the Local Environment	1
11.1.3	Sensitive Aspects of the Water Environment included for further evaluation	2
11.1.4	Sensitive Aspects excluded from further evaluation	2
11.1.5	Overview of the Subject Development	3
11.1.6	The Authors of the Water Chapter	3
11.1.7	Sources of Baseline Information	3
11.1.7.1	Certainty and Sufficiency of Information Provided	5
11.1.8	Methodology for Evaluating Effects	6
11.1.8.1	NRA Criteria for Estimating the Importance of Hydrology Attributes	6
11.1.8.2	NRA Criteria for Estimating the Magnitude of Impacts on Hydrology Attributes	8
11.1.8.3	NRA Criteria for Rating Impacts on Hydrology Attributes	9
11.1.8.4	Methodology for Evaluating Cumulative Impacts (Other Projects or Activities)	9
11.1.8.5	Methodology for Identifying Wells & Springs	9
11.2	Sensitive Aspect No.1: Local Surface Water Bodies	11
11.2.1	BASELINE CHARACTERISTICS of Local Surface Water Bodies	11
11.2.1.1	STUDY AREA for Water - Local Surface Water Bodies	11
11.2.1.2	Baseline Context and Character of Local Surface Water Bodies in the UWF Replacement Forestry Study Area	11
11.2.1.3	Importance of Local Surface Water Bodies	12
11.2.1.4	Sensitivity of Local Surface Water Bodies	12
11.2.1.5	Trends in the Baseline Environment (the 'Do-Nothing' scenario)	12
11.2.1.6	Receiving Environment (the Baseline + Trends)	12
11.2.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	13
11.2.2.1	Overview of Other Elements, Other Projects or Activities	13
11.2.2.2	Cumulative Evaluation Study Area	14
11.2.2.3	Cumulative Information: Baseline Characteristics – Context & Character	16
11.2.2.4	Cumulative Information Baseline Characteristics - Importance of Local Surface Water Bodies ...	25
11.2.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Local Surface Water Bodies	25
11.2.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)	25
11.2.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	26

11.2.3	PROJECT DESIGN MEASURES for Local Surface Water Bodies	27
11.2.4	EVALUATION OF IMPACTS to Local Surface Water Bodies.....	28
11.2.4.1	Impact Evaluation Table: Morphological impacts to watercourses due to in-stream works	29
11.2.4.2	Impact Evaluation Table: Surface water quality impacts during conifer plantation tree felling ...	32
11.2.4.3	Impact Evaluation Table: Surface water quality impacts due to earthworks	35
11.2.4.4	Impact Evaluation Table: Water quality impacts from dewatering of excavations	39
11.2.4.5	Impact Evaluation Table: Surface Water Quality Impacts due to Watercourse Crossing Works...	42
11.2.4.6	Impact Evaluation Table: Surface Water Quality Impacts during Directional Drilling Works	45
11.2.4.7	Impact Evaluation Table: Surface Water Impacts due to Contamination by Fuels, Oils and Chemicals.....	47
11.2.4.8	Impact Evaluation Table: Water Quality Impacts from Cement Based Compounds	50
11.2.4.9	Impact Evaluation Table: Increased flood risk.....	53
11.2.4.10	Impact Evaluation Table: Surface Water Quality Impacts due to Runoff from Permanent Hardstanding Surfaces.....	56
11.2.4.11	Cumulative Impacts Evaluation : Local Surface Water Body: Surface Water Quality Effects from Suspended Sediments	59
11.2.4.12	Description and Rationale for Excluded (scoped out) Impacts	63
11.2.5	Mitigation Measures for Impacts to Local Surface Water Bodies.....	64
11.2.6	Evaluation of Residual Impacts to Local Surface Water Bodies	64
11.2.7	Application of Best Practice and EMP for Local Surface Water Bodies.....	64
11.2.8	Summary of Impacts to Local Surface Water Bodies	65
11.3	Sensitive Aspect No.2: Local Groundwater Bodies	67
11.3.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	67
11.3.1.1	Baseline Characteristics of Local Groundwater Bodies in relation to UWF Replacement Forestry	67
11.3.1.2	UWF Replacement Forestry Project Design	67
11.3.1.3	Evaluation of UWF Replacement Forestry	67
11.3.1.4	Cumulative Evaluation for the Other Elements of the Whole UWF Project (grey background)	68
11.3.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	69
11.3.2.1	Overview of Other Elements, Other Projects or Activities	69
11.3.2.2	Cumulative Evaluation Study Area	69
11.3.2.3	Cumulative Information: Baseline Characteristics – Context & Character	70
11.3.2.4	Cumulative Information Baseline Characteristics - Importance of Local Groundwater Bodies.....	72
11.3.2.5	Cumulative Information Baseline Characteristics – Sensitivity of Local Groundwater Bodies	72
11.3.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	72
11.3.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends).....	72

11.3.3	Cumulative Information: PROJECT DESIGN MEASURES for Local Groundwater Bodies	73
11.3.4	Cumulative Information: EVALUATION OF IMPACTS to Local Groundwater Bodies	74
11.3.4.1	Impact Evaluation Table: Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals.....	75
11.3.4.2	Impact Evaluation Table: Groundwater quality impacts from cement-based compounds	78
11.3.4.3	Impact Evaluation Table: Groundwater level (quantity) impacts from dewatering of excavations	80
11.3.4.4	Cumulative Information: Description and Rationale for Excluded (scoped out) Impacts.....	82
11.3.5	Mitigation Measures for Impacts to Local Groundwater Bodies	83
11.3.6	Evaluation of Residual Impacts to Local Groundwater Bodies.....	83
11.3.7	Application of Best Practice Methods	83
11.3.8	Summary of Impacts to Local Groundwater Bodies.....	84
11.4	Sensitive Aspect No.3: Local Wells & Springs	85
11.4.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	85
11.4.1.1	Baseline Characteristics of Local Wells & Springs in relation to UWF Replacement Forestry	85
11.4.1.2	Evaluation of UWF Replacement Forestry	85
11.4.1.3	Cumulative Evaluation for the Other Elements of the Whole UWF Project (grey background)....	85
11.4.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	86
11.4.2.1	Overview of Other Elements, Other Projects or Activities.....	86
11.4.2.2	Cumulative Evaluation Study Area	86
11.4.2.3	Cumulative Information: Baseline Characteristics – Context & Character	88
11.4.2.4	Cumulative Information: Importance of Local Wells & Springs	89
11.4.2.5	Cumulative Information: Sensitivity of Local Wells & Springs	89
11.4.2.6	Cumulative Information: Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	89
11.4.2.7	Cumulative Information: Receiving Environment (the Baseline + Trends)	89
11.4.3	Cumulative Information: PROJECT DESIGN MEASURES for Local Wells & Springs	90
11.4.4	Cumulative Information: EVALUATION OF IMPACTS to Local Wells & Springs.....	91
11.4.4.1	Cumulative Information: Description and Rationale for Excluded (scoped out) Impacts.....	92
11.4.5	Mitigation Measures for Impacts to Local Wells & Springs	94
11.4.6	Evaluation of Residual Impacts to Local Wells & Springs	94
11.4.7	Application of Best Practice and the EMP for Local Wells & Springs	94
11.4.8	Summary of Impacts to Local Wells & Springs	95
11.5	Sensitive Aspect No.4: Lower River Shannon SAC	97
11.5.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	97
11.5.1.1	Baseline Characteristics of the Lower River Shannon SAC in relation to UWF Replacement Forestry.....	97
11.5.1.2	Evaluation of UWF Replacement Forestry	97

11.5.1.3	Cumulative Evaluation for the Other Elements of the Whole UWF Project (<i>grey background</i>)....	97
11.5.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	98
11.5.2.1	Overview of Other Elements, Other Projects or Activities	98
11.5.2.2	Cumulative Evaluation Study Area	98
11.5.2.3	Cumulative Information: Baseline Characteristics – Context & Character	100
11.5.2.4	Cumulative Information Baseline Characteristics - Importance of Lower River Shannon SAC....	101
11.5.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Lower River Shannon SAC	101
11.5.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	102
11.5.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends).....	102
11.5.3	Cumulative Information: PROJECT DESIGN MEASURES for Lower River Shannon SAC	103
11.5.4	Cumulative Information: EVALUATION OF IMPACTS to Lower River Shannon SAC.....	104
11.5.4.1	Impact Evaluation Table: Surface water quality impacts due to tree felling	105
11.5.4.2	Impact Evaluation Table: Surface water quality impacts due to earthworks (excavations and overburden storage).....	107
11.5.4.3	Impact Evaluation Table: Surface water quality impacts from dewatering of excavations.....	110
11.5.4.4	Impact Evaluation Table: Surface water quality impacts from watercourse crossing works	113
11.5.4.5	Impact Evaluation Table: Surface water quality impacts during directional drilling works.....	115
11.5.4.6	Impact Evaluation Table: Water quality impacts from fuels, oils and chemicals.....	117
11.5.4.7	Impact Evaluation Table: Water quality impacts from cement-based compounds.....	119
11.5.4.8	Cumulative Impacts Evaluation : Surface Water Quality Effects from Suspended Sediments	121
11.5.4.9	Cumulative Information: Description and Rationale for Excluded (scoped out) Impacts.....	124
11.5.5	Mitigation Measures for Impacts to Lower River Shannon SAC	126
11.5.6	Evaluation of Residual Impacts to Lower River Shannon SAC.....	126
11.5.7	Application of Best Practice and the EMP for the Lower River Shannon SAC.....	126
11.5.8	Summary of Impacts to the Lower River Shannon SAC.....	127
11.6	Sensitive Aspect No.5: Lower River Suir SAC.....	129
11.6.1	BASELINE CHARACTERISTICS of Lower River Suir SAC.....	129
11.6.1.1	STUDY AREA for Lower River Suir SAC.....	129
11.6.1.2	Baseline Context and Character of Lower River Suir SAC in the UWF Replacement Forestry Study Area	129
11.6.1.3	Importance of Lower River Suir SAC.....	129
11.6.1.4	Sensitivity of Lower River Suir SAC.....	129
11.6.1.5	Trends in the Baseline Environment (the ‘Do-Nothing’ scenario).....	130
11.6.1.6	Receiving Environment (the Baseline + Trends).....	130
11.6.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	131

11.6.2.1	Overview of Other Elements, Other Projects or Activities	131
11.6.2.2	Cumulative Evaluation Study Area	131
11.6.2.3	Cumulative Information: Baseline Characteristics – Context & Character	133
11.6.3	PROJECT DESIGN MEASURES for Lower River Suir SAC.....	134
11.6.4	EVALUATION OF IMPACTS to Lower River Suir SAC	135
11.6.4.1	Impact Evaluation Table: Surface water quality impacts due to tree felling	136
11.6.4.2	Impact Evaluation Table: Surface water quality impacts due to earthworks	138
11.6.4.3	Impact Evaluation Table: Surface water quality impacts from watercourse crossing works	141
11.6.4.4	Impact Evaluation Table: Water quality impacts from fuels, oils and chemicals.....	143
11.6.4.5	Impact Evaluation Table: Water quality impacts from cement-based compounds.....	145
11.6.4.6	Description and Rationale for Excluded (scoped out) Impacts	147
11.6.5	Mitigation Measures for Impacts to Lower River Suir SAC	149
11.6.6	Evaluation of Residual Impacts to Lower River Suir SAC.....	149
11.6.7	Application of Best Practice Measures.....	149
11.6.8	Summary of Impacts to the Lower River Suir SAC.....	150
11.7	Sensitive Aspect No.6: Bleanbeg Bog NHA	151
11.7.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	151
11.7.1.1	Baseline Characteristics of Bleanbeg Bog NHA in relation to UWF Replacement Forestry	151
11.7.1.2	Evaluation of UWF Replacement Forestry	151
11.7.1.3	Cumulative Evaluation for the Other Elements of the Whole UWF Project (grey background)	151
11.7.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	152
11.7.2.1	Overview of Other Elements, Other Projects or Activities.....	152
11.7.2.2	Cumulative Evaluation Study Area	152
11.7.2.3	Cumulative Information: Baseline Characteristics – Context & Character	153
11.7.2.4	Cumulative Information Baseline Characteristics - Importance of Bleanbeg Bog NHA	155
11.7.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Bleanbeg Bog NHA	155
11.7.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	155
11.7.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends).....	155
11.7.3	Cumulative Information: PROJECT DESIGN MEASURES for Bleanbeg Bog NHA	156
11.7.4	Cumulative Information: EVALUATION OF IMPACTS to Bleanbeg Bog NHA.....	156
11.7.4.1	Cumulative Information: Description and Rationale for Excluded (scoped out) Impacts.....	157
11.7.5	Mitigation Measures for Impacts to Bleanbeg Bog NHA.....	159
11.7.6	Evaluation of Residual Impacts to Bleanbeg Bog NHA	159
11.7.1	Application of Best Practice and the EMP for Bleanbeg Bog NHA	159

11.7.2	Summary of Impacts to Bleanbeg Bog NHA	160
11.8	Sensitive Aspect No.7: Local Water Dependent Habitats.....	161
11.8.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	161
11.8.1.1	Baseline Characteristics of Local Water Dependent Habitats.....	161
11.8.1.2	Evaluation of UWF Replacement Forestry	161
11.8.1.3	Cumulative Evaluation for the Other Elements of the Whole UWF Project (grey background).....	161
11.8.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	162
11.8.2.1	Overview of Other Elements, Other Projects or Activities.....	162
11.8.2.2	Cumulative Evaluation Study Area	162
11.8.2.3	Cumulative Information: Baseline Characteristics – Context & Character	163
11.8.2.4	Cumulative Information Baseline Characteristics - Importance of Local Water Dependent Habitats	164
11.8.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Local Water Dependent Habitats	164
11.8.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	164
11.8.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends).....	164
11.8.3	Cumulative Information: PROJECT DESIGN MEASURES for Local Water Dependent Habitats...	165
11.8.4	Cumulative Information: EVALUATION OF IMPACTS to Local Water Dependent Habitats	166
11.8.4.1	Impact Evaluation Table: Drainage of Marsh Fritillary habitat	167
11.8.5	mitigation Measures for Impacts to Local Water Dependent Habitats.....	169
11.8.6	Evaluation of Residual Impacts to Local Water Dependent Habitats.....	169
11.8.7	Application of Best Practice and the EMP for Local Water Dependent Habitats.....	169
11.8.8	Summary of Impacts to Local Water Dependent Habitats.....	170
11.9	Policy Context.....	171
11.9.1	National Policy.....	171
11.9.2	Mid-West Regional Planning Guidelines 2010-2022	171
11.9.3	North Tipperary County Development Plan 2010 (as varied):	172
11.10	Best Practice Measures	173
11.11	Summary of the Water Chapter.....	174
11.11.1	Summary of UWF Replacement Forestry Impacts	174
11.11.2	Summary of the Cumulative Impacts	174
11.11.3	Summary of Impacts from Other Elements of the Whole UWF Project	175
11.12	Reference List	176

List of Figures

Figure No.	Figure Title
Figure RF 11.1.1	Location of the UWF Replacement Forestry – River Basin
Figure RF 11.1.2	Location of the UWF Replacement Forestry – Regional Hydrology
Figure RF 11.2.1	Local Surface Water Bodies within the UWF Replacement Forestry Study Area
Figure RF 11.2.2	Local Surface Water Bodies (WFD) within UWF Replacement Forestry Study Area
Figure CE 11.2.1	Local Surface Water Bodies within the Cumulative Evaluation Study Area
Figure CE 11.2.2	Local Surface Water Bodies (WFD) within the Cumulative Evaluation Study Area
Figure RF 11.3	Local Groundwater Bodies within the UWF Replacement Forestry Study Area
Figure CE 11.3	Local Groundwater Bodies within the Cumulative Evaluation Study Area
Figure RF 11.4	Local Wells & Springs within the UWF Replacement Forestry Study Area
Figure CE 11.4	Local Wells & Springs within the Cumulative Evaluation Study Area
Figure CE 11.5	Lower River Shannon SAC within the Cumulative Evaluation Study Area
Figure RF 11.6	Lower River Suir SAC within the UWF Replacement Forestry Study Area
Figure CE 11.6	Lower River Suir SAC within the Cumulative Evaluation Study Area
Figure CE 11.7	Bleanbeg Bog NHA within the Cumulative Evaluation Study Area
Figure CE 11.8	Local Water Dependent Habitats within the Cumulative Evaluation Study Area

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

List of Appendices

Appendix No.	Appendix Title
Appendix 11.1	Survey of Existing and Proposed Watercourse Crossing Locations
Appendix 11.2	Surface Water Sampling Results
Appendix 11.3	Flood Risk Assessment
Appendix 11.4	UWF Grid Connection HDD Risk Assessment

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/ivers 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 ions 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.

Water

Topic

List of Abbreviations

<u>Abbreviation</u>	<u>Full Term</u>
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

Topic	Water
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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 the Clodiagh River regional and local surface water bodies within the Suir River Basin District (RBD).

The Clodaigh River catchment has very high significance as it contains a Natura 2000 designated site downstream of the project (i.e. Lower River Suir SAC).

In respect of groundwater, the existing environment comprises the Templemore A GWB. This GWB has been classified as “Good Status” by the Water Framework Directive (WFD) characterisation process, and mainly comprises Locally Important and 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.

The location of UWF Replacement Forestry is shown on [Figure RF 11.1.1 Location of the UWF Replacement Forestry – River Basin](#) and [Figure RF 11.1.2: Location of UWF Replacement Forestry – Regional Hydrology](#)

[Figures and mapping referenced in this topic chapter can be found in Volume C3 EIAR Figures.](#)

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	Bleanbeg Bog NHA	Section 11.7
Sensitive Aspect No.7	Local Water Dependent Habitats	Section 11.8

Each of the above listed Sensitive Aspects are evaluated individually in Sections 11.2 to 11.8 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 11.8. 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**:

Mauherslieve Bog NHA	Evaluated as having no potential for effects due to: Mauherslieve Bog NHA is an upland blanket bog which is located approximately 6.5km west of the <u>UWF Replacement Forestry</u> , 5km west of the UWF Related Works and Upperchurch Windfarm and 0.6km north of the UWF Grid Connection (110kV UGC at Route Section S71 – S72). The 110kV UGC route runs downslope (down-gradient) at a distance of approximately 0.6km. Due to the relatively large down-gradient 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 <u>UWF Replacement Forestry</u> , UWF Related Works, Upperchurch Windfarm and UWF Other Activities are not located within the Clare River catchment therefore there is no potential for effects by these Elements. 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 Replacement Forestry is the subject development, being the subject of a current afforestation license application to the Minister for Agriculture, Food and the Marine.

Table 11-1: Subject Development –UWF Replacement Forestry

<u>Project ID</u>	<u>The Subject Development</u>	<u>Composition of the Subject Development</u>
Element 3	<u>The Subject Development</u> UWF Replacement Forestry (RF)	Replacement Forestry at Foilnaman

Note: The UWF Replacement Forestry is 'Element 3' 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 Replacement Forestry (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

<u>Type</u>	<u>Source</u>
Consultation	<p>Feedback was received from</p> <ul style="list-style-type: none"> • 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 <p>See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details..</p>
Industry Guidance	<ul style="list-style-type: none"> • 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;

Type	Source
	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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); • Chapter 10; Soils • Pre-surveyed dwelling house locations as an indicator of potential local groundwater supplies (i.e. wells). • 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 • ESB Wind Development Ltd. and Coillte (2013) Bunkimalta Wind Energy Project Environmental Impact Statement prepared by ESB • Newport Distributer Road planning documents 07511157 , 13510103 • An Bord Pleanála (2013) Inspectors Report for Bunkimalta Wind Energy Project PL22.241924
Fieldwork	<ul style="list-style-type: none"> • Walkover survey and hydrological mapping, and surface water sampling (a total of 2 no. rounds of sampling was completed at 1 no. location at the UWF Replacement Forestry site); (refer to Appendix 11.2), • Walkover surveys and hydrological mapping of the UWF Grid Connection route was undertaken (2 no. full walkover surveys of the route were completed); • Walkover surveys and hydrological mapping at the UWF Related Works areas at the Consented Windfarm site; • Mapping and characterisation of all watercourse crossings along the construction works areas;

Type	Source
	<ul style="list-style-type: none"> • A total of 41 no. of trial pits were undertaken at the Mountphilips - Upperchurch 110kV UGC study area to assess soil / subsoil lithology, subsoil depth and groundwater conditions; (refer to Appendix 10.1 of Soils Chapter) • 2 no. boreholes were completed at each of the three river crossings along the 110kV UGC route (i.e. 6 no. boreholes in total) to assess subsoil, bedrock and groundwater conditions (i.e. Mulkear River, Bilboa River and Clare River); (refer to Appendix 10.2 of Soils Chapter) • Survey of existing and proposed watercourse crossings; (refer to Appendix 11.1) • Surface water sampling (a total of 3 no. rounds of sampling was completed at 16 no. sampling locations along the UWF Grid Connection route); (refer to Appendix 11.2) • Surface water sampling (a total of 2 no. rounds of sampling was completed at 5 no. locations at the UWF Related Works area); (refer to Appendix 11.2); • Well survey of private dwellings, and their associated water supplies (wells or springs if present) within 50m of the construction works areas; • A geophysical survey of the UWF Grid Connection watercourse crossing on the Mulkear River (refer to Appendix 10.5 of Soils Chapter) • Identification of local water supplies along the works area through public consultation meetings with the local community; • A site specific Flood Risk Assessment (Stage II) was undertaken for the Whole UWF Project (refer to Appendix 11.3); and, • A HDD risk assessment and associated field surveys were carried out for the UWF Grid Connection at the Newport (Mulkear) River, Clare River and Bilboa River crossing locations (Refer to Appendix 11.4).

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)

<u>Importance</u>	<u>Criteria</u>	<u>Typical Example</u>
Extremely High	Attribute has a high quality or value on an international scale.	<ul style="list-style-type: none"> • 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 value on a regional or national scale.	<ul style="list-style-type: none"> • River, wetland or surface water body ecosystem protected by national legislation – NHA status • 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.	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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)

<u>Magnitude of Impact</u>	<u>Criteria</u>	<u>Typical Examples</u>
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)

<u>Magnitude</u>	<u>Criteria</u>	<u>Typical Examples</u>
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 elements of the Whole UWF Project with Other Projects or Activities is evaluated in Section 11.2.4.11. In addition, the cumulative effect is evaluated individually for each local surface water bodies as required.

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 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.

¹ NFGWS - National Federation of Group Water Schemes

Introduction, Authors, Sources, Methodology

Topic	Water
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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 Replacement Forestry is described in Table 11-8 and illustrated on **Figure RF 11.2.1: Local Surface Water Bodies within the UWF Replacement Forestry Study Area** and **Figure RF 11.2.2: Local Surface Water Bodies (WFD) within the UWF Replacement Forestry Study Area** (Volume C3 EIAF Figures).

Table 11-8: UWF Replacement Forestry 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 Replacement Forestry Study Area

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 11-9. 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 11-9: 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 11-9. 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.

<div>Local Surface Water Bodies</div> <div>Sensitive Aspect</div>	<p><u>Classification of Watercourses at Crossing Locations</u></p> <p>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.</p> <p><u>Results of Surface Water Sampling</u></p> <p>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.</p> <p><u>Flood Risk Assessment</u></p> <p>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 and this report is attached as Appendix 11.3. A summary of the flood risk assessment is provided below.</p> <p>A section of the UWF Replacement Forestry site at Foilnahan is within a mapped fluvial flood zone. However, there is no new permanent infrastructure associated with this afforestation site.</p>
	<div>11.2.1.3 Importance of Local Surface Water Bodies</div> <p>The watercourse which flows through the UWF Replacement Forestry lands is a headwater stream of the Clodiagh River. Under the WFD, there is a requirement to protect, enhance and restore all waters with an aim to achieve at least Good Status for all waterbodies, including the Clodiagh.</p> <div>11.2.1.4 Sensitivity of Local Surface Water Bodies</div> <p>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.</p> <div>11.2.1.5 Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)</div> <p>Based on the WFD surface waterbody reports (www.wfdireland.ie), 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</p> <div>11.2.1.6 Receiving Environment (the Baseline + Trends)</div> <p>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 Replacement Forestry. This is based on the assumption that surface waterbodies will have to achieve at least Good Status.</p>

11.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

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

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

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

11.2.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Local Surface Water Bodies 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: EIA Report Appendices (Volume C4 EIAR Appendices)**.

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 Replacement Forestry 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 A2.3.11)**.

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Local Surface Water Bodies with UWF Replacement Forestry, however in order to present the totality of the project - Bunkimalta Windfarm and Newport Distributor Road (both consented) have been scoped in for evaluation of cumulative effects relating to the Other Elements.

11.2.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Replacement Forestry Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 11-10.

Table 11-10: Cumulative Evaluation Study Area for Local Surface Water 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	As defined by local surface water catchments and regional surface water catchments.	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 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities: Bunkimalta Windfarm Newport Distributor Road		
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 Replacement Forestry).	No Other Projects or Activities were scoped in at a local surface water body scale. The Other Projects or Activities scoped in at a regional catchment scale are shown in the left column.	

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 11-11.

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 11.2.1 Local Surface Water Bodies within the Cumulative Evaluation Study Area** and **Figure CE 11.2.2: Local Surface Water Bodies (WFD) within the Cumulative Evaluation Study Area** (Volume C3 EIAF Figures).

Table 11-11: Results of the Evaluation of the Other Elements and Other Projects and Activities

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Included</u> for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	<u>Included</u> for the evaluation of cumulative effects

Element 5: UWF Other Activities	<p><u>Evaluated as excluded</u>: 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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore no impacts are expected.</p>	Local Surface Water Bodies
Other Project or Activity		
Bunkimalta Windfarm	<p>Note: The Bunkimalta Windfarm is not located within the same local surface water bodies as the UWF Replacement Forestry (i.e. Clodiagh River SWB), therefore the Bunkimalta Windfarm cannot cause cumulative effects to Local Surface Water Bodies with the UWF Replacement Forestry. However, the Other Elements must be considered because the UWF Replacement Forestry is 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.</p> <p>Yes, <u>included</u> for the evaluation of cumulative sedimentation effects with the UWF Grid Connection on a regional catchment scale with respect to the downstream SAC's.</p> <p><u>Evaluated as excluded</u>: 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.</p>	Water
Newport Distributor Road	<p>The Newport Distributor Road is not located within the same local surface water bodies as the UWF Replacement Forestry (i.e. Clodiagh River SWB), therefore the Newport Distributor Road cannot cause cumulative effects to Local Surface Water Bodies with the UWF Replacement Forestry. However, the Other Elements must be considered because the UWF UWF Replacement Forestry is 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.</p> <p>Yes, <u>included</u> for the evaluation of cumulative sedimentation effects on a regional catchment scale with respect to the downstream SAC's.:</p> <p><u>Evaluated as excluded</u>: Neutral cumulative effects with UWF Grid Connection to water quality due to instream works and oils/cement contamination due to the separation distance and due to the small volumes likely to be present (Newport). 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.</p>	

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.

11.2.2.3.1 Element 1: UWF Grid Connection

Within the River Shannon catchment, the Mountphilips Substation site and c.26.3km 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), Small River, Clare River (also referred to as the Annagh River) and the Bilboa River. Within the River Suir catchment, the last c.1.2km of the 110kV UGC route is located within the Clodiagh River local surface water body.

There are a total of 90. No watercourses within the construction works area boundary associated with the UWF Grid Connection. Of this 90 no., 24 no. watercourse crossings are located along haul routes (AR1 to AR 8), no works are required at these watercourses, and delivery vehicles will cross over the existing culvert/bridge. These 24 no. watercourses along the haul routes are scoped out for further assessment because no impacts on surface water quality are expected. The watercourses at the remaining 66 no. crossings are located along the 110kV UGC (65 no.) and along AR9 (1 no.) and are evaluated herein.

Due to the primarily upland nature of the study area, with construction works taking place through upland forestry and agricultural lands, the majority of the watercourses intercepted by the UWF Grid Connection are either drains or minor headwater (1st - 2nd order) streams. A smaller number of larger stream crossings and river crossings are required in some of the valleys intercepted by the route of the 110kV UGC such as the Newport River (also called the Mulkear River), the Clare River and the Bilboa River.

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 11-12 below. The occurrence of the 110kV UGC, or new permanent or temporary access roads and joint bays, is also identified for each surface water body in Table 11-12.

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

Table 11-12: Summary of Regional Hydrology, Local Hydrology and Proposed Infrastructure along the UWF Grid Connection (110kV UGC)

Re-regional Catchment	Local SWBs ¹	WFD SWB	WFD River Waterbody ²	Length of 110kV UGC (km)	No. Watercourse Crossings	New Perm Road (km)	Temporary Road (km)	No. Joint Bays
Shannon	Newport River ³	SH_Mulkear_Newport TRIB_1Kilcomenty ¹	Newport_030	0.85	4	0.7	0.45	1
		SH_Mulkear_Newport MAIN_1Lower	Newport_030	2.9	6	0.74	1.5	3
	Small River	SH_Mulkear_Small_1	Small_010	5	13	1.8	0.7	7
	Clare River	SH_Mulkear_AnnaghT RIB_1Abington	Annagh_020	3.1	11	0.1	0.96	5

Re-gional Catchment	Local SWBs ¹	WFD SWB	WFD River Waterbody ²	Length of 110kV UGC (km)	No. Watercourse Crossings	New Perm Road (km)	Temporary Road (km)	No. Joint Bays
		SH_Mulkear_AnnaghMAIN_2Upper	Annagh_010	1.3	4	0.13	0.61	2
		SH_Mulkear_AnnaghTRIB_2Abington	Annagh_010	2.7	11	0.22	1.2	4
	Bilboa River	SH_Mulkear_BilboaTRIB_4Abington	Bilboa_010	1.2	1	0	0.9	2
		SH_Mulkear_BilboaMAIN_2Mid	Bilboa_010	1.0	3	0.3	0	1
		SH_Mulkear_BilboaMAIN_3Upper	Bilboa_010	5.0	9	0.2	1.3	7
		SH_Mulkear_BilboaMAIN_4Upper	Bilboa_010	0.7	0	0.045	0.08	1
		SH_Mulkear_Aughvanna_1	Inch (Bilboa)_010	2.6	2	0.05	1.2	4
Suir	Clodiagh River	SE_SuirClodiagh_ClodiaghUpper_Upper	Clodiagh_010	1.2	2	0.07	0.46	1

Local Surface Water Bodies

Sensitive Aspect

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 11-13. 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 11-13: Summary of EPA Q-Values for Surface Water Bodies in the UWF Grid Connection Study Area

WFD Waterbody	River	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

Water

Topic

Local Surface Water Bodies

Sensitive Aspect

<u>WFD Waterbody</u>	<u>River</u>	<u>EPA Watercourse*</u>	<u>EPA Location Description</u>	<u>Easting / Northing</u>	<u>EPA Q Status</u>
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

The Water Framework Directive “Status” and “Risk Result” for surface water bodies in the area of the UWF Grid Connection are shown in Table 11-14. The relevant Individual Project Element is identified in the righthand 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 11-14: WFD Waterbody Status and Risk Result

<u>Regional Catchment</u>	<u>WFD River Waterbody</u>	<u>WFD Status</u>	<u>WFD Risk Result</u>	<u>Whole UWF Project Element</u>
Shannon	Newport_030	Good	Not at Risk	GC (Mountphilips Substation)
	Small_010	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

Water

Topic

Detailed hydrological and aquatic field surveys of watercourses

As stated above, due to the upland nature of the majority of the study areas, many of the watercourses in proximity to the construction works area are manmade or heavily altered with respect to forestry and agriculture. Most of the larger watercourse crossings are located at the lower-lying agricultural land at the bottom of the main valleys within the local surface water bodies.

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](#).

Based on the field surveys, the watercourses are categorised Class 1 (highest fisheries value) to Class 4 (no fisheries value) as shown in Table 11-15.

Classification of Watercourses at Crossing Locations

There are a total of 90. No watercourses within the construction works area boundary associated with the UWF Grid Connection. Of this 90 no., 24 no. watercourse crossings are located along haul routes (AR1 to AR 8), no works are required at these 24 no. watercourses and delivery vehicles will cross over the existing culvert/bridge. These watercourses are scoped out for further assessment because no impacts on surface water quality are expected. The watercourses at the remaining 66 no. crossing locations are evaluated herein.

The majority of the 66 no. watercourse crossing points for the UWF Grid Connection relate to forestry / agricultural drains and small headwater streams with relatively low flows. Along the UWF Grid Connection 110kV UGC route, three larger watercourse crossings of note will occur, these watercourses include the Newport River, Bilboa River and Clare River (It's worth noting that no in-stream works are proposed at any of these 3 no. larger river crossing locations).

Shown in Table 11-15 below is a summary classification of the watercourses which will be crossed by the 110kV UGC route. The classification is based on detailed hydrological and aquatic surveys which took place in conjunction with the authors of Chapter 8: Biodiversity during 2016 and 2017. The majority of the watercourses at the crossing locations are Drains (~57%, Class 4). Approximately 35% of the watercourses are natural streams with potentially good fisheries value (Class 1 and Class 2).

Also, worth noting is that in-stream works are at only 38 no. of the 66 no. crossings and this is because the majority of watercourse crossing points are located on existing tracks in forestry where culverts are already in place (in this instance the cable will typically be placed below the existing culvert if possible). This is discussed further below in the impact section, Section 11.2.4.

Table 11-15: Summary Watercourse Characterisation at the 110kV UGC Crossing Locations

<u>Class</u>	<u>Watercourse Description</u>	<u>Total No.</u>	<u>Total With In-Stream Works</u>
Class 1	EPA mapped blue line, major river or stream (fisheries value)	14	9
Class 2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	10	6
Class 3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	5	4
Class 4	Drain (no fisheries value)	37	19
	Total	66	38

Note: the 24 No. watercourses which occur along access routes AR1 to AR8 are not included in this table.

Results of Surface Water Sampling

3 no. rounds of surface water sampling were completed at the larger Class 1 / Class 2 watercourse crossings, at 19 no. sampling locations along the UWF Grid Connection route. 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 (average result ~13mg/L) were typically well below 25mg/L which is the Freshwater Fish Directive 2006/44/EC threshold value.

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 Grid Connection 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.

The primary objective of this FRA is to identify areas potentially prone to fluvial and pluvial flooding along the UWF Grid Connection route with a focus being on residual risk to permanent infrastructure that will be present during the operational phase of the development. The potential impacts of the development on flooding were also assessed.

Of particular importance will be access to the Mountphilips Substation and the 110kv UGC joint bays (and their communication and link box chambers) for maintenance and upgrade purposes. Access to the joint bays and the Mountphilips Substation will be via permanent access roads.

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 W7, W8, W10 (Mulkear River), W11, W32, W36 (Clare River) and W57 (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 permanent infrastructure is required at these watercourses crossing locations). There are 38 no. joint bays located along the 110kV UGC and none of the locations or their associated permanent access roads are located within a mapped fluvial flood zone. The Mountphilips Substation site is also not located within a mapped fluvial flood zone.

11.2.2.3.2 Element 2: UWF Related Works

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 11-16 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 11-16.

Table 11-16: Summary of Regional and Local Hydrology at the UWF Related Works Areas

<u>Regional Catchment</u>	<u>Local SWB</u>	<u>WFD SWB</u>	<u>WFD Waterbody</u>	<u>Internal Cable (km)</u>	<u>HW works</u>	<u>RWR Works</u>	<u>No. WC Crossings</u>
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 – Haul Route Works, RWR – Realigned Windfarm Roads

As shown in Table 11-16 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 11-16 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 11-17.

Table 11-17: Summary of Local Drainage at the Haul Route Works Locations

<u>Location</u>	<u>Regional Catchment</u>	<u>Local Catchment</u>	<u>Local Hydrology</u>
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.
HW7A – HW7B	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 11-18. 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 11-18: Summary of Q-Values for Surface water Bodies in the UWF Related Works Study Area (EPA)

<u>WFD</u> <u>Waterbody</u>	<u>River</u>	<u>EPA</u> <u>Watercourse*</u>	<u>EPA</u> <u>Location</u> <u>Description</u>	<u>Easting</u> / <u>Northing</u>	<u>EPA</u> <u>Q</u> <u>Status</u>
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

Local Surface Water Bodies

Sensitive Aspect

The Water Framework Directive “Status” for surface water bodies in the area of the UWF Related Works are shown in Table 11-18.

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 11-19 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 11-19: Characterisation of Watercourse Crossings at the UWF Related Works areas

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

Water

Topic

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 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.

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.

11.2.2.3.3 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.

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.

Newport Distributor Road (consented): is located downstream of the UWF Grid Connection, in the Newport River catchment.

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 Replacement Forestry).

11.2.2.4 Cumulative Information Baseline Characteristics - 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 Grid Connection and 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.

11.2.2.5 Cumulative Information Baseline Characteristics - 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.

11.2.2.6 Cumulative Information Baseline Characteristics - 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. However, as stated in the Context sections above, the UWF Replacement Forestry site along with the majority

of the UWF Related Works and the majority of the Upperchurch Windfarm are located in the Clodiagh River catchment, which is **At Risk** from morphological impacts (channelization) forestry, and it is therefore considered that there are potential negative rising trends relating to water quality or morphology.

11.2.2.7 Cumulative Information Baseline Characteristics - 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 Grid Connection. This is based on the assumption that surface waterbodies will have to achieve at least Good Status

11.2.3 PROJECT DESIGN MEASURES for Local Surface Water Bodies

At the conception of the UWF Replacement Forestry, 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 Replacement Forestry Project Design Measures relevant to Local Surface Water Bodies

PD ID	Project Design Environmental Protection Measure (PD)
RF-PD 02	The lands will be planted by hand, using spades and hand tools.
RF-PD 03	No pesticide or fertilizer will be used at the UWF Replacement Forestry site.
RF-PD 04	There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the site/
RF-PD 05	A water setback from the watercourse which flows through the site will be established during planting works. The setback will be 10m from the edge of the watercourse. No planting or other works will be carried out in this 10m wide buffer area. Native woodland will be planted beyond this distance in accordance with Silvicultural Standards for Native Woodland Establishment GP9 & GP10 (Department of Agriculture, Food and the Marine, 2015).

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 Related Works and UWF Other Activities and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in **Appendices 5.3, 5.4, 5.5 and 5.6**, in **Volume C4: EIA Appendices**.

11.2.4 EVALUATION OF IMPACTS to Local Surface Water Bodies

In this Section, the likely direct and indirect effects of the UWF Replacement Forestry are identified and evaluated. Then the likely cumulative effects of the UWF Replacement Forestry 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 <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (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 to watercourse crossing works, (construction stage)	
Surface water quality impacts during directional drilling at the Newport (Mulkear) River, Clare River and Bilboa River Crossings, (construction stage) <i>(impact evaluation <u>only</u> relates to Other Elements of the Whole UWF Project)</i>	
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 11.2.4.10.**

Cumulative evaluation of Other Elements with Other Projects is presented in Section 11.2.4.11.

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 11.2.4.12.

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

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

Evaluation of UWF Replacement Forestry Excluded: Existing culvert crossings will be used to access the lands and no instream works will be required for the UWF Replacement Forestry, therefore there is no potential for UWF Replacement Forestry to cause morphological effects to Local Surface Water Bodies by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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.

Impact Description for the Other Elements of the Whole UWF Project

Project Life Cycle Stage: (for Other Elements only)	Construction stage
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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

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

Element 1: UWF Grid Connection

Impact Magnitude:

There are 65 no. watercourse crossings along the 110kV UGC and the 1 no. watercourse crossing along AR9, and in-stream works will be required at 38 no. of these locations. The impacts will be localised to the watercourse bank and bed at these crossing locations and will be mainly temporary in nature with the exception of 13 no. permanent crossing locations.

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 within several local surface water bodies over a 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;
- The 38 no. watercourse crossings where in-stream works are 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 27.5km);
- Over 62% 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 mostly small headwater streams;

Local Surface Water Bodies	<ul style="list-style-type: none"> • The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture); • The effects will typically be brief to temporary in nature and reversible with reinstatement of the watercourse channel (with the exception of the 13 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
	<p><u>Impact Magnitude:</u> There are 32 no. watercourse crossings required in total for the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Work.</p> <p>In-stream works will be required at 25 no. of these locations. 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. permanent crossings.</p> <p>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).</p>
	<u>Significance of the Impact:</u> Slight to Moderate
Sensitive Aspect	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 4: Upperchurch Windfarm
	<p><u>Impact Magnitude:</u> 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.</p>
	<u>Significance of the Impact:</u> Imperceptible
Water	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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.
	Evaluation of Cumulative Impacts – Morphological impacts to watercourses due to in-stream works
	All Elements of the Whole UWF Project
Topic	<p><u>Cumulative Impact Magnitude:</u> 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.</p>

Significance of the Cumulative Impact: Slight to ModerateRationale for Cumulative Impact Evaluation:

- As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- The in-stream works areas 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).

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

Evaluation of UWF Replacement Forestry Excluded: As there is no felling of conifers required for the UWF Replacement Forestry project, there is no potential for UWF Replacement Forestry to cause surface water quality effects to Local Surface Water Bodies by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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.

Impact Description for the Other Elements of the Whole UWF Project

Project Life Cycle Stage:
(for Other Elements only)

Construction stage

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

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

Element 1: UWF Grid Connection

Impact Magnitude:

Small areas of coniferous forestry at various locations along the 110kV UGC will be permanently felled to facilitate the construction of the 110kV UGC and its ancillary infrastructure.
In total, 1.3 hectares of forestry will be felled, and all this will all be within the River Shannon catchment. Surface water quality effects are likely to occur locally during the felling operation.
Due to the relatively small scale of the overall proposed felling area and the fact that the felling areas are located within separate local surface water bodies, the magnitude of impacts is considered to be Negligible to Small Adverse (refer to Table 11-5).

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;
- Relatively small felling area (~1.3ha in total) along the 110kV UGC;
- The total felling area will be spread out between a few local surface water bodies which reduces the overall effects;
- The tree felling area within individual local surface water bodies along the 110kV UGC is small (0.05 – 1.2ha);
- The total area to be felled will be completed in stages as required by the progress of the UWF Grid Connection works;
- 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,

<ul style="list-style-type: none">• All effects will be localized, brief to temporary in duration and reversible.
Element 2: UWF Related Works
<p><u>Impact Magnitude:</u> 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.</p>
<p><u>Significance of the Impact:</u> Imperceptible</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none">• 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 4: Upperchurch Windfarm
<p><u>Impact Magnitude:</u> 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.</p>
<p><u>Significance of the Impact:</u> Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none">• 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
<p><u>Cumulative Information: Individual Evaluations of Other Projects or Activities</u> (Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).</p>
<p>Other Project: Consented Bunkimalta Windfarm - Please refer to Section 11.2.4.11 for cumulative information</p>
<p>Other Project: Consented Newport Distributor Road - Please refer to Section 11.2.4.11 for cumulative information</p>

Local Surface Water Bodies	Evaluation of Cumulative Impacts – Surface water quality impacts during conifer plantation tree felling	
	All Elements of the Whole UWF Project	
Sensitive Aspect	<p><u>Cumulative Impact Magnitude:</u></p> <p>The Whole UWF Project has the potential to impact on surface water bodies in both the River Shannon and River Suir catchments. Felling areas are relatively small and located across several sub-catchments, and therefore effects will be localised.</p> <p>Given that the tree felling areas associated with the UWF Grid Connection are located within a separate regional surface water catchment to the UWF Related Works and the Upperchurch Windfarm 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.</p>	
	<u>Significance of the Cumulative Impact:</u> Imperceptible to Slight	
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies; • All tree felling associated with the 110kV UGC is located within the River Shannon catchment and all tree felling associated with the Consented UWF Turbines, and the UWF Related Works, are located within the River Suir catchment, and therefore no in-combination effects can occur; • 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; and, • The area to be felling for the UWF Related Works accounts for only 7% of the Upperchurch Windfarm felling area. 	
	All Elements of the Whole UWF Project with Other Projects or Activities	
	<p>- <i>Please refer to Section 11.2.4.11 for cumulative evaluation</i></p>	

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

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

Impact Description	
Project Life Cycle Stage:	Planting Stage
<p><u>Impact Source:</u> Planting works</p> <p><u>Cumulative Impact Source:</u> Earthworks/Storage of Overburden</p> <p><u>Impact Pathway:</u> Runoff and surface water flowpaths</p> <p><u>Impact Description:</u> Indirect surface water quality impacts from entrained sediment in surface water runoff arising during excavations and groundwork associated with the 110kV UGC trench (and ancillary works such as joint bays, access roads, temporary compounds and the Mountphilips Substation), Internal Windfarm Cabling trench, Haul Route Works and Realigned Windfarm Roads. There will also be a requirement for temporary and permanent overburden storage areas along the 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.</p> <p><u>Impact Quality:</u> Negative</p>	
Evaluation of the Subject Development Impact – Surface water quality impacts due to earthworks	
Element 3: UWF Replacement Forestry	
<p><u>Impact Magnitude:</u></p> <p>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 requirement for rill ploughing or any earthworks. The potential for the planting works to generate sediments in runoff is considered to be Negligible.</p>	
<u>Significance of the Impact: Imperceptible</u>	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
<p><u>Impact Magnitude:</u></p> <p>Indirect surface water quality impacts from entrained sediment in surface water runoff arising during excavations and groundwork associated with the 110kV UGC trench (and ancillary works such as joint bays, access roads, temporary compounds and the Mountphilips Substation), Internal Windfarm Cabling trench, Haul Route Works and Realigned Windfarm Roads. There will also be a requirement for temporary and permanent overburden storage areas along the 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</p>	

Local Surface Water Bodies	<p>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. Approximately 14,050m³ of overburden will be permanently excavated and stored along the construction works area boundary as linear berms and spread over the construction works area during reinstatement, in addition up to 11,140m³ will be temporarily removed and stored for later reinstatement along the works areas. It is possible that erosion of these storage areas could result in surface water quality impacts locally.</p>
Sensitive Aspect	<p><u>Significance of the Impact:</u> Imperceptible to Slight</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 27.5km) and within several local surface water bodies (i.e. Newport (Mulkear) River, Small River, Clare River, Bilboa River and Clodiagh River); • Only approximately 600m of the UWF Grid Connection and associated works will be completed in any one day (six crews completing 100m/day each) and this work will likely be distributed between the several local surface bodies over the length of the whole route; • 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 maximum length of temporary access road and permanent access road construction within any of the above named local surface water bodies is 3.5km and 1.8km respectively, which is relatively small; • Due to the small footprint area of the trenching, the potential to generate large volumes of sediment in runoff is low; • All material excavated from the trench will 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); • With the exception of 3 no. joint bays (J7, J18 and J19), all other joint bay locations are more than 50m from a Class 1 and Class 2 watercourse. J7, J18 and J19 are more than 25m from a Class 1 and Class 2 watercourse; • There are 24 no. designated temporary overburden storages areas over the length of the 110kV UGC, but 6 no. or less will only be ever present at any time (i.e. 6 no. crews working); • Temporary overburden storage areas will only remain in place for less than 1 week before the material is reinstated over the construction works area and the next section of the cable trench excavation is started (i.e. only relatively volumes of material will be in temporary storage at any one time); • The permanent storage areas are distributed out over a large geographical area and within several local surface water bodies and therefore the total volume of overburden stored within each surface water body is relatively small; • The permanent storage berms will be seeded immediately after emplacement (Project Design Measure); • The section of the UWF Grid Connection completed in any particular day will be fully reinstated before the next section is commenced; • The majority of the watercourses intercepted by the works area are drains or marginal watercourses with no or low flows, and therefore the effectiveness of them acting as a surface water flowpath to the more sensitive downstream surface water bodies is limited; and, • Surface water quality effects will be localised to the works areas, brief to temporary in duration and reversible
Water	<p>Element 2: UWF Related Works</p> <p><u>Impact Magnitude:</u></p> <p>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.</p> <p>Up to 930m³ of overburden will be permanently stored along the internal cabling route as linear berms and up to 10,850m³ 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.</p>
Topic	

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;
- 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 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.

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;
- 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

Local Surface Water Bodies	<p>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 <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).</p>
	<p>Other Project: Consented Bunkimalta Windfarm - Please refer to Section 11.2.4.11 for cumulative information</p>
	<p>Other Project: Consented Newport Distributor Road - Please refer to Section 11.2.4.11 for cumulative information</p>
	<p>Evaluation of Cumulative Impacts – Surface water quality impacts due to earthworks</p>
Sensitive Aspect	<p>All Elements of the Whole UWF Project</p>
	<p><u>Cumulative Impact Magnitude:</u> 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.</p> <p>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.</p>
	<p><u>Significance of the Cumulative Impact: Slight to Moderate</u></p>
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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.
Topic	<p>All Elements of the Whole UWF Project with Other Projects or Activities - Please refer to Section 11.2.4.11 below</p>

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

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

Evaluation of UWF Replacement Forestry Excluded: As there is no requirement for deep excavations and no requirement for dewatering, there is no potential for UWF Replacement Forestry to cause surface water quality effects to Local Surface Water Bodies from dewatering of excavations by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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.

Impact Description for the Other Elements of the Whole UWF Project

Project Life Cycle Stage:
(for Other Elements only) Construction stage

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

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

Element 1: UWF Grid Connection

Impact Magnitude:

Based on the trial pit investigation (41 no. in total) and boreholes (6 no.) carried for the UWF Grid Connection, significant groundwater inflows into the cable trench are only likely to occur within the floodplains of the Newport (Mulkear) River, Clare River and Bilboa River. Trial holes undertaken along the rest of the 110kV route were mainly dry. Small inflows may arise from runoff depending on the local topography and weather conditions.

Dewatering will only be required at a very limited number of locations. Given that all 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;
- Trial pit investigation shows that trench dewatering with regard to groundwater inflows will not be required over the vast majority of the UWF Grid Connection route;
- Significant dewatering volumes are likely to arise at only 1 – 2 locations within each of the local surface water bodies (dewatering is expected to be required within the floodplains of Newport (Mulkear River), Clare River and Bilboa River);
- All water pumped from excavations within the floodplains of Newport (Mulkear River), Clare River and Bilboa River) will be treated using a recharge trench or settlement pond or a suitable treatment train such as a Silt-buster (Project Design Measure);
- 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.

Local Surface Water Bodies	Sensitive Aspect	Element 2: UWF Related Works
		<p><u>Impact Magnitude:</u> 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.</p>
		<p><u>Significance of the Impact:</u> Imperceptible</p>
		<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 4: Upperchurch Windfarm
		<p><u>Impact Magnitude:</u> 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.</p>
		<p><u>Significance of the Impact:</u> Not Significant.</p>
		<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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
		<p><u>Cumulative Information: Individual Evaluations of Other Projects or Activities</u> (Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).</p>
		<p>Other Project: Consented Bunkimalta Windfarm - Please refer to Section 11.2.4.11 for cumulative information</p>
		<p>Other Project: Consented Newport Distributor Road - Please refer to Section 11.2.4.11 for cumulative information</p>
Water	Topic	Evaluation of Cumulative Impacts – Water quality impacts from dewatering of excavations
		All Elements of the Whole UWF Project
		<p><u>Cumulative Impact Magnitude:</u> The main potential for impact will be limited to main watercourse crossings along the 110kV UGC. No significant excavation dewatering is expected for 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.</p>
		<p><u>Significance of the Cumulative Impact:</u> Imperceptible</p>
		<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;

- Significant excavation dewatering is only expected to be required within the floodplain of Newport (Mulkear) River, Clare River and Bilboa River within the regional River Shannon catchment and therefore in-combination effects from the Consented UWF Turbine works or the Internal Windfarm Cabling (within the Suir catchment) is not possible;
- 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.

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

- *Please refer to Section 11.2.4.11 below*

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

Evaluation of UWF Replacement Forestry Excluded: Existing culvert crossings will be used to access the lands and no instream works or watercrossing structure works will be required for the UWF Replacement Forestry, therefore there is no potential for UWF Replacement Forestry to cause surface water quality effects to Local Surface Water Bodies by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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.

Impact Description for the Other Elements of the Whole UWF Project

Project Life Cycle Stage: (for Other Elements only)	Construction stage
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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

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

Element 1: UWF Grid Connection

Impact Magnitude:

There are 65 no. watercourse crossings along the 110kV UGC and 1 no. crossing along AR9, in-stream works will be required at 38 no. of these locations. Surface water quality effects at each crossing are likely over the duration of the works (1-2 days per watercourse).
 Due to the relatively minor nature of the watercourses being crossed (with most being drains or of low ecological value) 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;
- In-stream works will only be required at 58% of the crossing locations (38 no. of 66);
- Over 62% of the in-stream works areas are at drains (Class 4) or marginal watercourses (Class 3);
- The drains (Class 5) 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);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;

- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (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 (27.5km);
- The watercourse crossings required for the 110kV UGC are distributed across several local surface water bodies over a large geographical area (latitudinal distance of 27.5km);
- The works will not negatively affect the overall surface water body status, and the magnitude of impact will not be significant; and,
- All effects will be localised, brief in nature and reversible.

Element 2: UWF Related Works

Impact Magnitude:

There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works and in-stream works will be required at 25 no. of these locations. 26 no. of the total 32 no. crossings are located within the Clodiagh River catchment, 5 no. in the Owenbeg, and 1 no. in the Bilboa. 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,
- All effects will be localised, brief in nature and reversible.

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

Local Surface Water Bodies	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: <ul style="list-style-type: none"> 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
Sensitive Aspect	Cumulative Information: Individual Evaluations of Other Projects or Activities (Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).
	Other Project: Consented Bunkimalta Windfarm - Please refer to Section 11.2.4.11 for cumulative information
	Other Project: Consented Newport Distributor Road - Please refer to Section 11.2.4.11 for cumulative information
Water	Evaluation of Cumulative Impacts – Surface Water Quality Impacts due to Watercourse Crossing Works
	All Elements of the Whole UWF Project
	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: <ul style="list-style-type: none"> 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 Windfarm Related 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 Windfarm Related 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.
Topic	
	All Elements of the Whole UWF Project with Other Projects or Activities - Please refer to Section 11.2.4.11 below

11.2.4.6 Impact Evaluation Table: Surface Water Quality Impacts during Directional Drilling Works

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

Evaluation of UWF Replacement Forestry Excluded: As there is no directional drilling works required for the UWF Replacement Forestry project, there is no potential for UWF Replacement Forestry to cause surface water quality effects to Local Surface Water Bodies by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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.

Impact Description for the Other Elements of the Whole UWF Project

Project Life Cycle Stage:
(for Other Elements only) Construction stage

Cumulative Impact Source: groundworks associated with drilling activities
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Surface water quality impacts on the Newport (Mulkear) River, Clare River and Bilboa River during ground-works associated with directional drilling under the river channel bed. Directional drilling under the river bed will be undertaken to prevent direct impacts on the watercourse. However, there is a risk of indirect impacts from sediment laden run-off during the launch pit, and reception pit excavation works. Frac-out during drilling has also the potential to impact on surface water quality.

There will be no requirement to undertake directional drilling elsewhere on the Newport (Mulkear) River, Clare River or Bilboa River. There will be no requirements for drilling for any other element of the Whole UWF Project.

Impact Quality: Negative

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

Element 1: UWF Grid Connection

Impact Magnitude:

Indirect water quality impacts on the Newport (Mulkear) River, Clare River and Bilboa River during earthworks associated with the directional drilling. Effects could be continuous over the drilling works (c.1 week). Given that all runoff and pumped water will be treated and then discharged at a location away from the Newport (Mulkear) River, Clare River and Bilboa River (Project Design Measure), the impact magnitude 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;
- Minimal ground levelling work will be required for the working platform area, and therefore significant generation of sediment laden runoff is not expected;
- Excavation work will mainly only be required for the launch pit and reception pit;
- The drilling pits will not have to be kept free of water, and therefore no pumping will be required (no risk of discharge entering the watercourse);
- The ground on either side of both watercourses is relatively flat, and therefore there is a low risk of runoff from the works areas getting into the watercourse;
- All runoff from the works area will be collected and pumped to a recharge trench or settlement pond (Project Design Measure);

Local Surface Water Bodies	Sensitive Aspect	<ul style="list-style-type: none"> • There will be no direct discharge of treated water into any watercourse or drain (Project Design Measure); • Effects will be brief in duration and reversible; and, • Based on the directional drilling assessment, the potential for frac-out is considered to be low.
		Element 2: UWF Related Works
		<u>Impact Magnitude:</u> None
		<u>Significance of the Impact:</u> No Impact
		<u>Rationale for Impact Evaluation:</u> No drilling works required.
		Element 4: Upperchurch Windfarm
		<u>Impact Magnitude:</u> None
		<u>Significance of the Impact:</u> No Impact
		<u>Rationale for Impact Evaluation:</u> No drilling works required.
		Element 5: UWF Other Activities – <i>N/A, evaluated as excluded, see Section 11.2.2.2.1</i>
Water	Topic	Cumulative Information: Individual Evaluations of Other Projects or Activities <i>(Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).</i>
		Other Project: Consented Bunkimalta Windfarm <i>- Please refer to Section 11.2.4.11 for cumulative information</i>
		Other Project: Consented Newport Distributor Road <i>- Please refer to Section 11.2.4.11 for cumulative information</i>
		Evaluation of Cumulative Impacts – Surface Water Quality Impacts during Directional Drilling Works
		All Elements of the Whole UWF Project
		<u>Cumulative Impact Magnitude:</u> No potential for effects cumulatively with the Other Elements of the Whole UWF Project – drilling works are only associated with the UWF Grid Connection (110kV UGC).
		<u>Significance of the Cumulative Impact:</u> No Cumulative Impact
		<u>Rationale for Cumulative Impact Evaluation:</u> <ul style="list-style-type: none"> • The UWF Grid Connection (110kV UGC route) is the only element which will result in impacts to Local Surface Water Bodies due to drilling works.
		All Elements of the Whole UWF Project with Other Projects or Activities <i>- Please refer to Section 11.2.4.11 for cumulative evaluation</i>

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

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

Impact Description	
Project Life Cycle Stage:	Planting 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 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, the magnitude of impact is considered to be Negligible.	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation:	
<ul style="list-style-type: none"> • Small scale of works • No refuelling or storage of fuels • Vehicles limited to 4 x 4 jeeps 	
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:	
<ul style="list-style-type: none"> • 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); • Overnight parking of plant and machinery will only be permitted at designated sites where there is a hardcore surface in place such as existing farmyards, and this reduces the risk posed by leaks (Project Design Measure); 	

Local Surface Water Bodies	<ul style="list-style-type: none"> • With the exception of the Newport (Mulkear) River, Clare River and Bilboa River crossing works, there will be no refuelling of plant or machinery permitted within 100m of a Class 1 or Class 2 watercourse (Project Design Measure); • All runoff from the Newport (Mulkear) River, Bilboa River and Clare River crossing works will be contained and treated for sediment. Therefore in the unlikely event of an oil/fuel spill or leak, any contaminated water can be contained and removed off-site (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; and, • Any effects that do occur will be very localised to the soils and subsoils at the source / works activity area.
Sensitive Aspect	<p>Element 2: UWF Related Works</p> <p><u>Impact Magnitude:</u> 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.</p> <p><u>Significance of the Impact:</u> Imperceptible</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 watercourse (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 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.
	<p>Element 4: Upperchurch Windfarm</p> <p><u>Impact Magnitude:</u> 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.</p> <p><u>Significance of the Impact:</u> Not Significant</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • A Fuel and Oil Management Plan is proposed which will storage requirements and emergency procedures for dealing with any spills and leaks.
Water	<p>Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 11.2.2.2.1.</p>

Evaluation of Cumulative Impacts – Surface Water Impacts due to Contamination by Fuels, Oils and Chemicals**All Elements of the Whole UWF Project**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 subcatchments 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: ImperceptibleRationale 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).

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

Evaluation of UWF Replacement Forestry Excluded: As there is no cement based compounds used for the UWF Replacement Forestry project, there is no potential for UWF Replacement Forestry to cause water quality effects to Local Surface Water Bodies by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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.

Impact Description for the Other Elements of the Whole UWF Project

Project Life Cycle Stage: (for Other Elements only)	Construction stage
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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.

Impact Quality: Negative

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);

<p>Local Surface Water Bodies</p> <p>Sensitive Aspect</p>	<ul style="list-style-type: none"> • There will be a requirement to have the 110kV UGC trench free of standing water prior to placement of the granular cement and therefore this avoids the risk of displacement/release of potential contaminated water during the works (this is especially relevant at the in-stream watercourse crossing locations); • All cement placed within the 110kV UGC trench will be backfilled with excavated material 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 2: UWF Related Works
	<p><u>Impact Magnitude:</u></p> <p>The use of cement-based compounds will be limited to the Telecom Relay Pole foundation (c.4m³) and to the 9 no. of public road crossings, the magnitude of impact is considered to be Negligible.</p>
	<p><u>Significance of the Impact:</u> Imperceptible</p>
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • Small scale of concrete use.
	Element 4: Upperchurch Windfarm
	<p><u>Impact Magnitude:</u></p> <p>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.</p>
	<p><u>Significance of the Impact:</u> Not Significant</p>
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 Cumulative Impacts – Water Quality Impacts from Cement Based Compounds	
All Elements of the Whole UWF Project	
<p><u>Cumulative Impact Magnitude:</u></p> <p>The Whole UWF Project 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.</p> <p>Given the distributed nature of the works within two regional surface water catchments and over several local subcatchments 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.</p>	
<u>Significance of the Cumulative Impact:</u> Imperceptible to Slight	
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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; 	

Local Surface Water Bodies	<ul style="list-style-type: none"> • All cement placed within the 110kV UGC cabling trench will be backfilled with excavated material 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 Upperchurch Windfarm, and therefore no significant in-combination effects with respect to the UWF Related Works are expected.
Sensitive Aspect	<p>Note: No cumulative evaluation of <u>Other Projects or Activities</u> is included in the table above, because <u>all</u> of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.2.2.2.1).</p>
Topic	Water

11.2.4.9 Impact Evaluation Table: Increased flood risk

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

Evaluation of UWF Replacement Forestry Excluded: As no requirement for any new new access roads, no requirement for permanent hardstanding areas or new culverts or the UWF Replacement Forestry project, there is no potential for UWF Replacement Forestry to cause increase flood risk at the site by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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

Impact Description for the Other Elements of the Whole UWF Project

Project Life Cycle Stage:
(for Other Elements only)

Operational Stage

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

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

Element 1: UWF Grid Connection

Impact Magnitude:

Permanent infrastructure along the 110kV UGC will mainly include 4.4km of access roads and the Mountphilips Substation compound area. Runoff from these surfaces may result in increased flow in local watercourses. There are 13 no. permanent watercourse crossings along the route of the 110kV UGC which potentially 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 distributed over a large geographical area (latitudinal distance of 27.5km) and within several local surface water bodies (i.e. Mulkear River, Small River, Clare River Bilboa River and Clodiagh River);
- The permanent hardstanding areas are negligible in comparison to the area of the local surface water body;
- The permanent access roads will have permanent road side drains in place which will include check dams for reduction of runoff rates (Project Design Measure); and,
- 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 will be sized to cope with a minimum 100-year flood event (Project Design Measure);

Local Surface Water Bodies	<ul style="list-style-type: none"> • 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 2: UWF Related Works
Sensitive Aspect	<p><u>Impact Magnitude:</u> 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.</p>
	<p><u>Significance of the Impact:</u> Imperceptible</p>
	<p><u>Rationale for Impact Evaluation:</u></p>
	<ul style="list-style-type: none"> • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies; <p><u>Hardstanding Runoff:</u></p> <ul style="list-style-type: none"> • 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. <p><u>New Permanent Culvert Crossings:</u></p> <ul style="list-style-type: none"> • 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..
Water	Element 4: Upperchurch Windfarm
	<p><u>Impact Magnitude:</u> 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.</p>
	<p><u>Significance of the Impact:</u> Not Significant</p>
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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.
Topic	Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 11.2.2.2.1

Evaluation of Cumulative Impacts – Increased flood risk	
All Elements of the Whole UWF Project	
<p><u>Cumulative Impact Magnitude:</u> 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.</p>	
Significance of the Cumulative Impact: Imperceptible	
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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; • 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).

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

Evaluation of UWF Replacement Forestry Excluded: As there is no new permanent hardstanding areas required for the UWF Replacement Forestry project, there is no potential for UWF Replacement Forestry to cause run-off related surface water quality effects to Local Surface Water Bodies by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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

Impact Description for the Other Elements of the Whole UWF Project

Project Life Cycle Stage:
(for Other Elements only)

Operational Stage

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

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

Element 1: UWF Grid Connection

Impact Magnitude:

Permanent infrastructure along the 110kV UGC will mainly include 4.4km of access roads and the Mountphilips Substation compound area. Runoff from these surfaces may generate sediments which could end up in local surface watercourses.

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 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 permanent hardstanding areas are distributed over a large geographical area (latitudinal distance of 27.5km) and within several local surface water bodies (i.e. Mulkear River, Small River, Clare River Bilboa River and Clodiagh River);
- The maximum length of permanent access road within any of the local surface water bodies is 0.7km (refer to Table 11-15 above);
- The permanent access roads will have permanent road side drains in place which will include silt traps for removal of sediment (Project Design Measure);
- The Mountphilips Substation will have a permanent surface water drainage network in place which will include a settlement pond for removal of sediment (Project Design Measure); and,
- All permanent roads within the SPA will be concealed access roads (i.e. the hard-core surface on the new road will be overlaid with a geocell membrane and this geocell will be in-filled with soil/peat and, depending on the location, planted with either an appropriate grass mix or locally sourced native heather species - Project Design Measure) which will help reduce surface water runoff rates.

Element 2: UWF Related Works	Local Surface Water Bodies Sensitive Aspect
<p><u>Impact Magnitude:</u> 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.</p>	
<u>Significance of the Impact:</u> Imperceptible	
<p><u>Rationale for Impact Evaluation:</u> 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.</p>	
Element 4: Upperchurch Windfarm	
<p><u>Impact Magnitude:</u> 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.</p>	
<u>Significance of the Impact:</u> Not Significant	
<p>• 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.</p>	
Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 11.2.2.2.1	
<p><u>Cumulative Information: Individual Evaluations of Other Projects or Activities</u> (Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).</p>	
<p>Other Project: Consented Bunkimalta Windfarm - Please refer to Section 11.2.4.11 for cumulative information</p>	
<p>Other Project: Consented Newport Distributor Road - Please refer to Section 11.2.4.11 for cumulative information</p>	
Evaluation of Cumulative Impacts – Surface Water Quality Impacts due to Runoff from Permanent Hardstanding Surfaces	
All Elements of the Whole UWF Project	
<p><u>Cumulative Impact Magnitude:</u> 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.</p>	
<u>Significance of the Cumulative Impact:</u> Imperceptible	Water
<p><u>Rationale for Cumulative Impact Evaluation:</u> • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;</p>	

Local Surface Water Bodies	<ul style="list-style-type: none"> • 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; • 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, • 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.
Sensitive Aspect	<p>All Elements of the Whole UWF Project with Other Projects or Activities</p> <p>- <i>Please refer to Section 11.2.4.11 for cumulative evaluation</i></p>

Topic	Water
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11.2.4.11 Cumulative Impacts Evaluation : Local Surface Water Body: Surface Water Quality Effects from Suspended Sediments

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

Evaluation of UWF Replacement Forestry Excluded: There is no potential for UWF Replacement Forestry to cause cumulative effects to surface water quality with either the Bunkimalta Windfarm or the Newport Distributor Road, as neither of these two Other Projects are located within the same local surface water bodies as the UWF Replacement Forestry (i.e. Clodiagh River SWB).

However, the Other Elements must be considered because the UWF Replacement Forestry 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 - <u>Clare River (Annagh River) Catchment</u>
Cumulative Impact:	Surface Water Quality Effects from Suspended Sediments
Cumulative Impact Description	
Project Stage	Construction Stage of UWF Grid Connection
<p><u>Cumulative Source:</u> Tree felling, Earthworks and Watercourse Crossing Works</p> <p><u>Cumulative Impact Description:</u> 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 <u>UWF Grid Connection (110kV UGC)</u> element of the Whole UWF Project, and the <u>Bunkimalta Windfarm</u>. The potential for cumulative effects is likely to be greater in the main Clare River channel downstream of the works.</p> <p>The <u>UWF Grid Connection</u> (110kV UGC) is the only project element within the Clare River catchment.</p> <p><u>Impact Quality:</u> Negative</p>	
Individual Evaluation of the UWF Grid Connection and of the Other Projects	
Element 1: UWF Grid Connection	
<p><u>UWF Grid Connection Magnitude:</u> Approximately 7km of the 110kV UGC exists within the Clare River catchment. Effects on surface water are likely to arise mainly from trench excavation works and watercourse crossings in-stream works. There are 26 no. watercourse crossings within the Clare River catchment.</p> <p>Due to the transient nature of the works and the fact that the majority of the watercourse crossings are drains, the impact magnitude is expected to be Negligible to Small Adverse.</p> <p><u>Significance of the Impact:</u> Imperceptible to Slight</p>	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water body; The majority of the watercourse crossings (17 of 26 no.) within the Clare River catchment are drains (Class 4 Watercourse), and therefore the potential for downstream water quality effects is much less due to their low or absent flows; Watercourse crossings at Class 1 and Class 2 watercourses will only be completed between the IFI permitted season of May and September (Project Design Measure); There is no in-stream works at the Clare River crossing itself as directional drilling will be undertaken; All runoff from the Clare River crossing works areas will be collected and treated prior discharge away from the watercourse itself; 	

Local Surface Water Bodies	<ul style="list-style-type: none"> • 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); • The transient nature of the works within the catchment; and, <p>All effects will be brief to temporary in nature and reversible.</p>
	<u>Other Project: Bunkimalta Windfarm</u>
	Impact Magnitude: 5 no. of the 16 No. consented Bunkimalta Windfarm turbines are located within the Clare River catchment upstream of the 110KV route.
	Significance of the Impact: Not Significant, as reported in the Bunkimalta WF EIS (2013)
	Rationale for Impact Evaluation: <ul style="list-style-type: none"> • 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.
	<u>Other Project: Newport Distributor Road</u>
	Impact Magnitude: None.
	Significance of the Impact: No Impact
	Rationale for Impact Evaluation: <ul style="list-style-type: none"> • Not located within the Clare River catchment
	Evaluation of Cumulative Impacts – Surface Water Quality Effects from Suspended Sediments
Sensitive Aspect	Cumulative Impact Magnitude: Due to the transient nature of the UWF Grid Connection works, 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 Small Adverse.
	<u>Significance of the Cumulative Impact:</u> Slight
	Rationale for Cumulative Impact Evaluation: <ul style="list-style-type: none"> • As per Table 11-7, 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 – 71km²; and, • The transient nature of the 110kV works within the Clare River catchment.

Water
Topic

Sensitive Aspect:	Local Surface Water Bodies - <u>Newport River (Mulkear River) Catchment</u>
Cumulative Impact:	Surface Water Quality Effects from Suspended Sediments
Cumulative Impact Description	
Project Stage	Construction Stage of the UWF Grid Connection
<p><u>Cumulative Source:</u> Tree felling, Earthworks and Watercourse Crossing Works</p> <p><u>Cumulative Impact Description:</u> Indirect surface water quality impacts on the Newport (Mulkear) River as a result of watercourse crossings, earthworks, groundworks and storage of overburden associated with the <u>UWF Grid Connection (110kV UGC)</u> element of the Whole UWF Project, the <u>Bunkimalta Windfarm</u> and the <u>Distributor Road at Newport</u>.</p> <p>The Small River drains into the Newport (Mulkear) River downstream of the 110kV UGC works. Therefore, when assessing activities in the Newport River catchment, activities in the Small River also have to be considered.</p> <p>The <u>110kV UGC</u> (including the Mountphilips Substation) is the only project element within the Newport (Mulkear) River catchment. The <u>110kV UGC</u> is the only project element within the Small River catchment.</p> <p><u>Impact Quality:</u> Negative</p>	
Individual Evaluation of the UWF Grid Connection and of the Other Projects	
Element 1: UWF Grid Connection	
<p><u>UWF Grid Connection Magnitude:</u> Approximately 8.7km of the 110kV UGC exists within the Newport River catchment (and Small River catchment) including the Mountphilips Substation site.</p> <p>Effects on surface water are likely to arise mainly from trench excavation, watercourse crossings in-stream works and overburden storage. There are 23 no. watercourse crossings within the Newport (and Small River) River catchment.</p> <p>Due to the transient nature of the works and the fact that the majority of the watercourse crossings are drains in the Small River catchment, the impact magnitude is expected to be Negligible to Small Adverse.</p>	
<u>Significance of the Impact:</u> Imperceptible to Slight	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water body; The majority of the watercourse crossings within the Small River catchment are drains (Class 4) and also as the route is largely along an existing forestry track; 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 as directional drilling will be undertaken (Project Design Measure); All runoff from the Newport (Mulkear) River crossing works areas will be collected and treated prior discharge away from the watercourse 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, <p>All effects will be brief to temporary in nature and reversible.</p>	
<u>Other Project: Bunkimalta Windfarm</u>	
<p><u>Impact Magnitude</u> 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).</p>	

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

Local Surface Water Bodies	<p>Significance of the Impact: Not Significant, as reported in the Bunkimalta WF EIS (2013)</p>
	<p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> • 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.
Sensitive Aspect	<p>Other Project: Newport Distributor Road</p>
	<p>Impact Magnitude: Localised work adjacent to the Newport River downstream of Newport town. Road development includes surface water drainage system and attenuation tanks, and will be connected into existing sewers. Localised work adjacent to the Newport River downstream of Newport town.</p>
	<p>Significance of the Impact: Not Significant</p>
	<p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> • As per planning conditions surface water controls will be in place.
	<p>Evaluation of Cumulative Impacts – Surface Water Quality Effects from Suspended Sediments</p>
	<p>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 relatively large combined catchment area of the Newport River and Clare River (126km²), the magnitude of effects is likely to be Small Adverse.</p>
	<p>Significance of the Cumulative Impact: Slight</p>
	<p>Rationale for Cumulative Impact Evaluation:</p> <ul style="list-style-type: none"> • As per Table 11-7, Small 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 (8km); • The fact that the majority of the 110kv UGC route within the Small River catchment is along forestry tracks; • The large combined surface water catchment area of the Newport River and Small River catchment – 126km²; • The relatively large upstream distance of the Bunkimalta Windfarm site (~10km) 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 Bunkimalta grid connection is along public roads and therefore impacts on surface water quality are not expected.

11.2.4.12 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	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	<p>Rationale for Excluding: Neutral effect.</p> <p>The surface water quality effects on local surface water bodies from sedimentation as a result of tree felling for the <u>UWF Grid Connection</u> and <u>UWF Related Works</u> 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.</p> <p>The <u>Upperchurch Windfarm</u> 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.</p> <p><u>UWF Replacement Forestry</u>: 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.</p>
Decommissioning Stage Effects				
<p>Rationale for Excluding: no potential for impacts/Neutral impacts</p> <p><u>UWF Grid Connection</u> will remain part of the National Grid. Therefore no hydrological impacts are expected.</p> <p><u>UWF Related Works</u>: 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.</p> <p><u>UWF Replacement Forestry</u> will not be harvested or felled but will remain permanently in place. Therefore no hydrological impacts are expected.</p> <p><u>Upperchurch Windfarm</u>: 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.</p>				

11.2.5 Mitigation Measures for Impacts to Local Surface Water Bodies

Mitigation measures were incorporated into the UWF Replacement Forestry project design. 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 Replacement Forestry.

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 EMP for Local Surface Water Bodies

The UWF Replacement Forestry will be planted in accordance with Forest Service Department of Agriculture, Food & the Marine *Felling and Reforestation Policy (2017)*, and Guidance Documents – *Native Woodland Establishment GPC9 and GPC10 Silvicultural Standards (2015)*, *Environmental Requirements for Afforestation (2016)* and *Management Guidelines for Ireland Native Woodlands (2017)*.

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 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.

Local Surface Water Bodies

Sensitive Aspect

Water

Topic

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

		Surface water quality impacts							Water quality impacts from		
	Morphologic al Impacts due to instream works	due to tree felling	due to earthworks	from dewatering of excavations	from watercourse crossing works	during directional drilling works	Runoff from Permanent surfaces	fuels, oils and chemicals	from cement-based compounds	Increased Flood Risk	
Impact to Local Surface Water Bodies:											
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 11.2.4.6	Section 11.2.4.10	Section 11.2.4.7	Section 11.2.4.8	Section 11.2.4.9	
Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction	Construction	Operational	Construction	Construction	Operational	
Element 3: UWF Replacement Forestry	No Potential for Impact	No Potential for Impact	Imperceptible	No Potential for Impact	No Potential for Impact	No Potential for Impact	No Potential for Impact	Imperceptible	No Potential for Impact	No Potential for Impact	
Element 1: UWF Grid Connection	Slight to Moderate	Imperceptible to Slight	Imperceptible to Slight	Imperceptible	Imperceptible to Slight	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible	
Element 2: UWF Related Works	Slight to Moderate	Imperceptible	Slight to Moderate	Imperceptible	Imperceptible to Slight	No potential for Impact	Imperceptible	Imperceptible	Imperceptible	Imperceptible	
Element 4: Upperchurch WF	Imperceptible	Not Significant	Not Significant	Not Significant	Imperceptible	No Potential for Impact	Not Significant	Imperceptible	Not Significant	Not Significant	
Element 5: UWF Other Act.	No Potential for Impact - Evaluated as Excluded, see Section 11.2.2.2.1										
Cumulative Impact											
All Elements of the Whole UWF Project	Slight to Moderate	Imperceptible to Slight	Slight to Moderate	Imperceptible	Imperceptible to Slight	No Cumulative Impact	Imperceptible	Imperceptible	Imperceptible to Slight	Imperceptible	
All Elements of the Whole UWF Project cumulatively with Other Projects or Activities: Bunkmalta WF Newport Distrib. Rd	No Potential for Cumulative Impact	Slight– See Section 11.2.4.11 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 Replacement Forestry).						No Potential for Cumulative Impact - Evaluated as Excluded, see Section 11.2.2.2.1			

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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

11.3.1.1 Baseline Characteristics of Local Groundwater Bodies in relation to UWF Replacement Forestry

The UWF Replacement Forestry site is located entirely within the Templemore A GWB – See Figure RF 11.3: **Local Groundwater Bodies within the UWF Replacement Forestry Study Area.**

Within the Templemore A GWB, the area within and around the UWF Replacement Forestry site is underlain by Poor Bedrock Aquifers.

11.3.1.2 UWF Replacement Forestry Project Design

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the UWF Replacement Forestry – 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 11-24 are relevant to **Local Groundwater Bodies**.

Table 11-24: UWF Replacement Forestry Project Design Measures relevant to Local Groundwater Bodies

PD ID	Project Design Environmental Protection Measure (PD)
RF-PD-02	The lands will be planted by hand, using spades and hand tools.
RF-PD-03	No pesticide or fertilizer will be used at the UWF Replacement Forestry site.
RF-PD-04	There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the site

11.3.1.3 Evaluation of UWF Replacement Forestry

The UWF Replacement Forestry was evaluated for its potential to cause impacts to Local Groundwater Bodies.

It was evaluated by the topic authors that **no likely impacts or no potential for impacts to Local Groundwater Bodies are likely to occur** due to the UWF Replacement Forestry, for the following reasons:

- 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 refuelling 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.

Local Groundwater Bodies	11.3.1.4 Cumulative Evaluation for the Other Elements of the Whole UWF Project (grey background)	
	<p>UWF Replacement Forestry is part of a whole project which comprises the following Other Elements; Element 1: UWF Grid Connection, Element 2: UWF Related Works, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Replacement Forestry is Element 3. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.</p> <p>UWF Replacement Forestry is <u>not likely to cause impacts or has no potential to cause impacts to Local Groundwater Bodies</u> by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry is part of a whole project. Therefore, the <u>cumulative information and evaluations for the Other Elements of the Whole UWF Project</u> are included in Section 11.3.2 to Section 11.3.4 and included in the summary table in Section 11.3.8 in order <u>to show the totality of the project</u>.</p>	
Sensitive Aspect		
Topic	Water	

11.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.3.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Local Groundwater Bodies 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 11.3.2.2.1** below.

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 Replacement Forestry or with any of the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of 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 A2.3.11)**.

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 Replacement Forestry 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 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 11-25.

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

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 300m of another Element.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

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 CE 11.3: Local Groundwater Bodies within the Cumulative Evaluation Study Area**.

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

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Included</u> for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	<u>Included</u> for the evaluation of cumulative effects
Element 5: UWF Other Activities	<p><u>Evaluated as excluded</u>: 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.</p>

11.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.3.2.3.1 Element 1: UWF Grid Connection

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 26.3km of the total 27.5km) within the Slieve Phelim Groundwater Body (GWB) with the far eastern section of the 110kV UGC route extending into the Templemore A GWB.

The Templemore A GWB extends from north of Templemore south towards Annacathy and has a total area of 300km². 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 location of the subject development in relation to Local Groundwater Bodies is illustrated on [Figure GC 11.3: Location of Local Groundwater Bodies within the UWF Grid Connection Study Area](#), Figure GC 11.3 is included in the UWF Grid Connection EIA Report (2018) in [Volume E: Reference Documents](#).

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 520km². The regional groundwater flow direction at the location of the construction works areas within the Slieve Phelim GWB is to the south.

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.

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 quality⁴¹ No. trial pits were undertaken along the route of the UWF Grid Connection 110kV UGC. The trial pits were undertaken during winter 2016 and spring 2017 when groundwater levels would be at their highest. The pits, which were excavated to a depth of at least ~1.2m (the depth of the 110kV UGC cable trench), were generally found to be dry (i.e. no groundwater inflows were recorded as the subsoils / shallow bedrock are unsaturated).

Groundwater inflows were recorded in a small number of the trial pits along the 110kV UGC, and these trial pits were located close to the Newport (Mulkear) River, Clare River and the Bilboa River and the watercourse at crossing WC7. The boreholes undertaken at the Newport (Mulkear) River (RC05 & RC06), Clare River (RC04 & RC03) and the Bilboa River (RC01 – RC02) recorded groundwater inflows at depths less than 1m below the local ground level.

11.3.2.3.2 Element 2: UWF Related Works

The UWF Related Works exist within two separate Groundwater Bodies (GWBs) which are called the Slieve Phelim GWB and the Templemore A GWB.

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 Groundwater Bodies are made up of various local bedrock aquifer types. Both GWBs comprise Poor Bedrock Aquifers in the area of the UWF Related Works.

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.

Local Groundwater Bodies	11.3.2.3.3	Element 4: Upperchurch Windfarm
	<p>The Upperchurch Windfarm exists within two separate Groundwater Bodies (GWBs) which are called the Slieve Phelim GWB and the Templemore A GWB.</p> <p>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.</p> <p>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.</p>	
	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	
Sensitive Aspect	11.3.2.3.5	Other Projects or Activities
	Not applicable – <u>No</u> Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.3.2.1.	
	11.3.2.4 Cumulative Information Baseline Characteristics - Importance of Local Groundwater Bodies	
	<p>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'² (www.catchments.ie). This applies to both quantitative status and chemical status. The objective, under the Waterframe Directive is to protect the current 'Good Status' condition.</p> <p>Also, groundwater is used locally as a drinking water supply and therefore good groundwater quality is important from a human health perspective</p>	
	11.3.2.5 Cumulative Information Baseline Characteristics – Sensitivity of Local Groundwater Bodies	
	<p>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>i.e.</i> 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.</p>	
	11.3.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)	
	<p>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>i.e.</i> reduction in groundwater quality or groundwater levels) have been reported.</p>	
Water	11.3.2.7 Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	
	<p>It is assumed that the groundwater body status within the study area will be at least Good during the timeline of the Other Elements of the Whole UWF Project. This is based on the assumption that groundwater bodies will have to achieve at least Good Status.</p>	
Topic	<hr/> <p>²'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).</p>	

11.3.3 Cumulative Information: PROJECT DESIGN MEASURES for Local Groundwater Bodies

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

Local Groundwater Bodies

Sensitive Aspect

Water

Topic

11.3.4 Cumulative Information: EVALUATION OF IMPACTS to Local Groundwater Bodies

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Local Groundwater Bodies**, see Section 11.3.1.

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) - Local Groundwater Bodies.

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

Table 11-27: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals (construction stage)	<i>Operational Stage Effects</i>
Groundwater quality impacts from cement-based compounds (construction stage)	<i>Decommissioning Stage Effects</i>
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

Local Groundwater Bodies

Sensitive Aspect

Evaluation of UWF Replacement Forestry Excluded: As there is no refuelling or storage of fuels on site (Project Design Measure), there is no potential for UWF Replacement Forestry to cause groundwater quality effects to Local Groundwater Bodies itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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) Construction stage

Impact Source: n/a

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

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 Compounds. 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; and,

Water

Topic

Local Groundwater Bodies	<ul style="list-style-type: none"> 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
	<p><u>Impact Magnitude:</u></p> <p>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.</p>
	<u>Significance of the Impact:</u> Imperceptible
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> 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 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.
Sensitive Aspect	Element 4: Upperchurch Windfarm
	<p><u>Impact Magnitude:</u></p> <p>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.</p>
	<u>Significance of the Impact:</u> Not Significant
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> 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
Water	Evaluation of Cumulative Impacts – Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals
	All Elements of the Whole UWF Project
	<p><u>Cumulative Impact Magnitude:</u></p> <p>Plant and equipment will be used at all the Whole UWF Project works areas, and therefore groundwater along the whole works area 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.</p>
	<u>Significance of the Cumulative Impact:</u> Imperceptible
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> 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 (Slieve Phelim GWB) and the UWF Related Works (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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.3.2.1).

Local Groundwater Bodies

Sensitive Aspect

Water

Topic

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

Evaluation of UWF Replacement Forestry Excluded: As there is no use of cement based compounds required for the UWF Replacement Forestry project, there is no potential for UWF Replacement Forestry to cause water quality effects to Local Groundwater Bodies by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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) Construction stage

Impact Source: n/a

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

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.

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 (~0.4m³), 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);
- Based on the trial pit investigation (during which the vast majority of the trial holes were found to be dry) it is expected that cement will only come in direct contact with groundwater closer to the larger watercourse crossings (Newport (Mulkear), Clare, Bilboa) where there is a shallower groundwater table locally;
- Only a brief to temporary (and reversible) increase in the pH and alkalinity of the groundwater in direct contact with the cement 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 2: UWF Related Works	
<u>Impact Magnitude:</u> 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.	
<u>Significance of the Impact:</u> No Impact	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> The volumes to be used on-site are negligible, and therefore no impacts on groundwater quality are expected. 	
Element 4: Upperchurch Windfarm	
<u>Impact Magnitude:</u> 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.	
<u>Significance of the Impact:</u> Imperceptible	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> 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 only 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 Cumulative Impacts – Groundwater quality impacts from cement-based compounds	
All Elements of the Whole UWF Project	
<u>Cumulative Impact Magnitude:</u> 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.	
Significance of the Cumulative Impact: Imperceptible	
<u>Rationale for Cumulative Impact Evaluation:</u> <ul style="list-style-type: none"> 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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.3.2.1).

Local Groundwater Bodies

Sensitive Aspect

Water

Topic

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

Evaluation of UWF Replacement Forestry Excluded: As there is no requirement for deep excavations and no requirement for dewatering for the afforestation project, there is no potential for UWF Replacement Forestry to cause surface water quality effects to Local Groundwater Bodies from dewatering of excavations by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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) Construction stage

Impact Source: n/a

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

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

Element 1: UWF Grid Connection

Impact Magnitude:

Some localised cable trench dewatering is likely to be required along the floodplains at the main watercourse crossings (3 no. locations). Based on the trial pit investigation, the vast majority of the cable trench excavation will be dry. Also, due to the shallow nature of the works, the magnitude of impact on groundwater levels 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 aquifer (Poor to Locally Important);
- Significant groundwater inflows into the 110kV UGC cable trench are only expected within the floodplains at the main watercourse crossing locations (i.e. Newport (Mulkear) River, Clare River and Bilboa River);
- Due to the shallow nature of the cable trench / joint bays, the effects on local groundwater levels and flows will be negligible;
- Effects will be brief in duration and reversible; and,
- All of the remainder of the trial pits undertaken along the 110kV UGC were found to be dry, and therefore impacts on groundwater flowpaths downslope of the 110kV UGC are not expected.

Element 2: UWF Related Works

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

<p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> • Due to the shallow nature of the works and the elevated nature of the works area, no impacts on groundwater levels are expected.
<p>Element 4: Upperchurch Windfarm</p>
<p>Impact Magnitude:</p> <p>Impacts relating to groundwater levels and flows was not undertake in the 2013 EIS and therefore are evaluated below for the purpose of the cumulative impact assessment.</p> <p>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.</p>
<p>Significance of the Impact: Imperceptible</p>
<p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> • 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.
<p>Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 11.3.2.2.1</p>
<p>Evaluation of Cumulative Impacts – Groundwater level (quantity) impacts from dewatering of excavations</p>
<p>All Elements of the Whole UWF Project</p>
<p>Cumulative Impact Magnitude:</p> <p>Negligible groundwater level effects locally where cable trench dewatering is required which will be a limited number of locations (3) along the UWF Grid Connection construction works areas. The magnitude of impact will be per as the UWF Grid Connection.</p>
<p>Significance of the Cumulative Impact: Imperceptible</p>
<p>Rationale for Cumulative Impact Evaluation:</p> <ul style="list-style-type: none"> • As per Table 11-7, Negligible magnitude combined with the Low to Medium Importance of the local Aquifer; • The shallow nature of the works and the very limited interaction with the groundwater table; • The works areas associated with the 110kV UGC (Slieve Phelim GWB) and the turbine foundations associated with the Upperchurch Windfarm (Templemore A GWB) are in separate local groundwater bodies, and therefore there is no potential for in-combination effects; • Due to the elevated nature of the Upperchurch Windfarm, significant interaction with the local groundwater table is not expected; and, • Groundwater flowpaths in the area of the Upperchurch Windfarm Works are expected to be localised (i.e. any recharge on the local hills will discharge into local streams) and therefore significant in-combination effects cannot occur.
<p>Note: No cumulative information for <u>Other Projects or Activities</u> is included in the table above, because <u>no</u> Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Local Groundwater Bodies with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.3.2.1).</p>

11.3.4.4 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 the table below.

Table 11-28: Description and Rationale for Excluded Impacts to Local Groundwater Bodies

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway(s)</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
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				
<p>Rationale for Excluding: no potential for impacts/Neutral impacts</p> <p><u>UWF Grid Connection</u> will remain part of the National Grid. Therefore no hydrological impacts are expected.</p> <p><u>UWF Related Works</u>: 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.</p> <p><u>Upperchurch Windfarm</u>: It is likely that the Consented UWF Substation will remain in-situ for use by ESNB 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.</p>				

11.3.5 Mitigation Measures for Impacts to Local Groundwater Bodies

Mitigation measures were incorporated into the UWF Replacement Forestry project design including the Project Design Measures. No additional mitigation measures are required as there is **no potential for UWF Replacement Forestry to cause impacts** occur to Local Groundwater Bodies.

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 the Evaluation of UWF Replacement Forestry (Section 11.3.1), i.e. **no potential for impacts**.

11.3.7 Application of Best Practice Methods

The UWF Replacement Forestry will be planted in accordance with Forest Service Department of Agriculture, Food & the Marine *Felling and Reforestation Policy (2017)*, and Guidance Documents – *Native Woodland Establishment GPC9 and GPC10 Silvicultural Standards (2015)*, *Environmental Requirements for Afforestation (2016)* and *Management Guidelines for Ireland Native Woodlands (2017)*.

11.3.8 Summary of Impacts to Local Groundwater Bodies

No impacts to Local Groundwater Bodies are concluded by the topic authors as likely to occur as a consequence of the development of UWF Replacement Forestry.

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 11-29: 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 (relates to Other Elements only)	Section 11.3.4.1	Section 11.3.4.2	Section 11.3.4.3
Project Life-Cycle Stage (relates to Other Elements only)	Construction	Construction	Construction
<u>UWF Replacement Forestry</u>	No likely Impact/No potential for Impact Evaluated as Excluded - See Section 11.3.1		
Element 1: UWF Grid Connection	Imperceptible	Imperceptible	Imperceptible
Element 2: UWF Related Works	Imperceptible	No Impact	No 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		
<u>Cumulative Impact:</u> (relates to Other Elements only)			
All Other Elements of the Whole UWF Project	Imperceptible	Imperceptible	Imperceptible

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 Groundwater Bodies with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.3.2.1).

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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

11.4.1.1 Baseline Characteristics of Local Wells & Springs in relation to UWF Replacement Forestry

UWF Replacement Forestry is located in a sparsely populated area, no wells or springs were identified within 50m of the afforestation lands - See Figure RF 11.4: Local Wells & Springs within the UWF Replacement Forestry Study Area (found in Volume C3 EIAR Figures).

11.4.1.2 Evaluation of UWF Replacement Forestry

It was evaluated by the topic authors that the UWF Replacement Forestry has **no potential to cause impacts to Local Wells & Springs**, for the following reasons:

- There are no springs or wells within 50m of the UWF Replacement Forestry lands.

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

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

UWF Replacement Forestry has **no potential to cause impacts to Local Wells & Springs** by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 11.4.2 to Section 11.4.4 and included in the summary table in Section 11.4.8 in order to show the totality of the project.

11.4.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.4.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Local Well & Springs 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 11.4.2.2.1 below.

The evaluation of cumulative impacts to Local Well & 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 Well & Springs with either the UWF Replacement Forestry 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. 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 Replacement Forestry 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 Cumulative Evaluation Study Area

The study area for the cumulative evaluation is described in Table 11-30.

Table 11-30: Cumulative Evaluation Study Area for Local Wells & Springs

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	With 300m of the construction works areas associated with the various elements of the Whole UWF Project	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 300m.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

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 and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Local Wells & Springs. The results of this evaluation are included in Table 11-31.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on [Figure CE 11.4: Local Wells & Springs within the Cumulative Evaluation Study Area](#) (found in Volume C3 EIA Figures).

Table 11-31: Results of the Evaluation of the Other Elements of the Whole UWF Project

Cumulative Element/Project/Activity	Results of the evaluation of the Other Elements
Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Included</u> for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	<u>Evaluated as excluded</u> : 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	<p><u>Evaluated as excluded</u>: No likely effect/Neutral effect/No potential for effects due to:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

11.4.2.3 Cumulative Information: Baseline Characteristics – Context & Character**11.4.2.3.1 Element 1: UWF Grid Connection**

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 Grid Connection construction works areas identified only 1 no. well - mapped well 1715NEW064 (GSI Ref) is located at Knockcurraghbola Commons townland at the eastern end of the UWF Grid Connection (110kV UGC route section S100). This bored well is located up-gradient of the construction works areas and therefore cannot be impacted, and consequently **is 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 the UWF Grid Connection Study Area, regarding the nature of their water supply and its location. 15 no. houses were identified within 50m of the UWF Grid Connection and 5 no. have their own private well (refer to Table 11-32 below for well locations). The rest are supplied by the public main. Of these 5 no. wells, **2 no.** are downslope of the construction works areas. The location of the UWF Grid Connection in relation to Local Wells & Springs is identified on **Figure GC 11.4.1 and 11.4.2: Local Wells & Springs within the UWF Grid Connection Study Area**. **Figure GC 11.4** is part of the EIA Report for the UWF Grid Connection, and is included in **Volume E: Reference Documents** with this planning application.

Table 11-32: Dwelling Houses within 50m of the UWF Grid Connection

Source ID	Location of Source in Relation to the UWF Grid Connection
GC Well 1	Down-slope of 110kV UGC (Section S54)
GC Well 2	Down-slope of 110kV UGC (Section S54)
GC Well 3	Up-slope of 110kV UGC (Section S54)
GC Well 4	Along-slope of 110kV UGC (Section S96)
GC Well 5	Along-slope of 110kV UGC (Section S96)

During the Public Consultation Meeting, **a private spring source in the townland Laghile** was identified (refer to **Figure GC 11.4.2**) at Laghile exists along the 110kV (section S73) just west of the Bilboa River crossing (@ E589053 N660179). The source, which were visited and inspected, is located approximately 260m (along slope) from the grid route and therefore **are scoped out for further assessment** as no impacts are anticipated.

11.4.2.3.2 Element 2: UWF Related Works

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

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 2 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), 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 2 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. As outlined in Table 11-33, **3 No.** 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 11.4.1 to RW 11.4.2: Local Wells & Springs within the Cumulative Evaluation Study Area** are part of the EIA Report for the UWF Grid Connection - included in **Volume E: Reference Documents** with this planning application.

Table 11-33: Dwelling Houses within 50m of the UWF Related Works

Supply Source ID	Location of Source in Relation to the UWF Related Works
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)

Local Wells & Springs

Sensitive Aspect

11.4.2.3.3 Element 4: Upperchurch Windfarm

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

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

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

11.4.2.4 Cumulative Information: 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.

11.4.2.5 Cumulative Information: 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.

11.4.2.6 Cumulative Information: 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.

11.4.2.7 Cumulative Information: 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.

Water

Topic

11.4.3 Cumulative Information: PROJECT DESIGN MEASURES for Local Wells & Springs

Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Grid Connection and UWF Related Works. 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 5.4](#) in [Volume C4: EIAR Appendices](#).

11.4.4 Cumulative Information: EVALUATION OF IMPACTS to Local Wells & Springs

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Local Well & Springs.** - see Section 11.4.1.

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) - Local Wells & Springs.

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

Table 11-34: List of all Impacts included and excluded from the Impact Evaluation Table sections

<u>Impacts Included</u> (Evaluated in the Impact Evaluation Table sections)	<u>Impacts Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
<u>No impacts included</u> for evaluation	<i>Surface water and groundwater Contamination from Oils, Fuels and Chemicals (construction stage)</i>
	<i>Surface water and groundwater Contamination from Cement Based Compounds (construction stage)</i>
	<i>Groundwater level and flow impacts (construction stage)</i>
	<i>Operational Stage Effects</i>
	<i>Operational Stage Effects</i>

The source-pathway-receptor links and the rationale for excluded impacts are described in Section 11.4.1 below.

11.4.4.1 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 11-35 below.

Table 11-35: 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	<p>Rationale for Excluding: no likely impact</p> <p>Only 5 no. wells are within 50m of the UWF Grid Connection works area (refer to Table 11-32). Two of these wells are located down-gradient of where the UWF Grid Connection works run along a public road (the rest of the wells are located upslope of the works). Due to the fact that all plant and machinery will be working on an impermeable tarmac surface, any minor spills or leaks are unlikely to percolate down into the underlying aquifer and flow towards these wells (surface water more at risk). In addition, no refuelling of plant or equipment will be permitted within 100m of these wells (Project Design Measure).</p> <p>There are 3 no. wells within 50m of UWF Related Works, all of which are located upslope of the works areas, therefore there is no potential for contamination effects.</p>
Use of Cement Based Compounds	1,2	SW Runoff GW Flowpaths	Surface water and groundwater Contamination from Cement Based Compounds	<p>Rationale for Excluding: no likely impact</p> <p>Only 2 no. wells within 50m of the works area (UWF Grid Connection) are located down-gradient of the works area in terms of groundwater flow (refer to Table 11-32). These wells are located down-gradient of where the 110kV runs along a public road. The use of cement for the UWF Grid Connection works in the area of the identified sources 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.</p> <p>There are 3 no. wells within 50m of UWF Related Works, all of which are located upslope of the works areas, therefore there is no potential for contamination effects.</p>
Excavation Dewatering (i.e. cable trench dewatering)	1,2	GW Flowpaths	Groundwater level and flow impacts	<p>Rationale for Excluding: no likely impact</p> <p>5 no. wells were identified within 50m of the UWF Grid Connection and 3 no. wells were identified within 50m of the UWF Related Works (see Table 11-32). However, due to the shallow nature of the excavation works (1.25m) and the fact that all the wells identified within 50m of the works area are deep bored wells, and therefore it is not expected that the excavation of a shallow trench in overburden/shallow bedrock will impact on</p>

Local Wells & Springs

Sensitive Aspect

Water

Topic

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

Local Wells & Springs

Sensitive Aspect

Water

Topic

11.4.5 Mitigation Measures for Impacts to Local Wells & Springs

Mitigation measures are not relevant as there is **no potential for UWF Replacement Forestry to cause impacts** to Local Well & Springs

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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Replacement Forestry (Section 11.4.1), i.e. **no potential for impacts**.

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

The UWF Replacement Forestry will be planted in accordance with Forest Service Department of Agriculture, Food & the Marine *Felling and Reforestation Policy (2017)*, and Guidance Documents – *Native Woodland Establishment GPC9 and GPC10 Silvicultural Standards (2015)*, *Environmental Requirements for Afforestation (2016)* and *Management Guidelines for Ireland Native Woodlands (2017)*.

11.4.8 Summary of Impacts to Local Wells & Springs

No impacts to Local Wells & Springs are concluded by the topic authors as likely to occur as a consequence of the development of UWF Replacement Forestry.

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 11-36: Summary of the impacts to Local Wells & Springs

Impact to Local Wells & Springs	Impact
<i>Evaluation (for Other Elements only)</i>	<i>Section 11.4.4.1</i>
Project Life-Cycle Stage (for Other Elements only)	All
UWF Replacement Forestry	No potential for Impacts Evaluated as Excluded- see Section 11.4.1
Element 1: UWF Grid Connection	No Likely Impacts
Element 2: UWF Related Works	No Likely Impacts
Element 4: Upperchurch Windfarm	potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Element 5: UWF Other Activities	potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Cumulative Impacts: (for Other Elements only)	
All Other 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 Local Wells & Springs with either the UWF Replacement Forestry 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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

11.5.1.1 Baseline Characteristics of the Lower River Shannon SAC in relation to UWF Replacement Forestry

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.

The UWF Replacement Forestry is located outside the River Shannon catchment.

11.5.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Lower River Shannon SAC. It was evaluated by the topic authors that the UWF Replacement Forestry has **no potential to cause impacts to the Lower River Shannon SAC**, for the following reasons:

- the UWF Replacement Forestry site occurs outside the boundary of both the Lower River Shannon SAC and the River Shannon regional catchment area.

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

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

UWF Replacement Forestry has no potential to cause impacts to Lower River Shannon SAC by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 11.5.2 to Section 11.5.4 and included in the summary table in Section 11.5.8 in order to show the totality of the project.

11.5.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.5.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Lower River Shannon SAC 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 11.5.2.2.1](#) below.

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 Replacement Forestry 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 \(Section A2.3 .1 and Section A2.3.11\)](#).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Lower River Shannon SAC with UWF Replacement Forestry, however in order to present the totality of the project – Bunkimalta Windfarm and Newport Distributor Road (both consented) have been scoped in for evaluation of cumulative effects relating to the Other Elements.

11.5.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 11-37.

Table 11-37: 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 catchment in which the Whole UWF Project is located. The Mulkear River catchment drains to the Lower River Shannon SAC. Extending the scoping area beyond the Mulkear River catchment would mean that the whole of the River Shannon catchment would be included and therefore at this vast scale, the Whole UWF Project would likely have a Neutral effect in relation to cumulative impacts.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Project: Bunkimalta Windfarm Newport Distributor Road 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 Replacement Forestry).		

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 11-38.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on **Figure CE 11.5: Lower River Shannon SAC within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 11-38: 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	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Included</u> for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	<u>Included</u> for the evaluation of cumulative effects
Element 5: UWF Other Activities	<p><u>Evaluated as excluded</u>: Neutral effect/No potential for effects due to:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
Other Project or Activity	
Bunkimalta Windfarm	<p>Yes, <u>included</u> for the evaluation of cumulative sedimentation effects from tree felling, earthworks, dewatering, directional drilling and watercourse crossing works.</p> <p><u>Evaluated as excluded</u>: 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.</p>
Newport Distributor Road	<p>Yes, <u>included</u> for the evaluation of cumulative sedimentation effects from tree felling, earthworks, dewatering, directional drilling and watercourse crossing works.</p> <p><u>Evaluated as excluded</u>: Neutral cumulative effects to water quality due to instream works and oils/cement contamination due to the separation distance and due to the small volumes likely to be present (Newport).</p>

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 Replacement Forestry).

11.5.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.5.2.3.1 Element 1: UWF Grid Connection

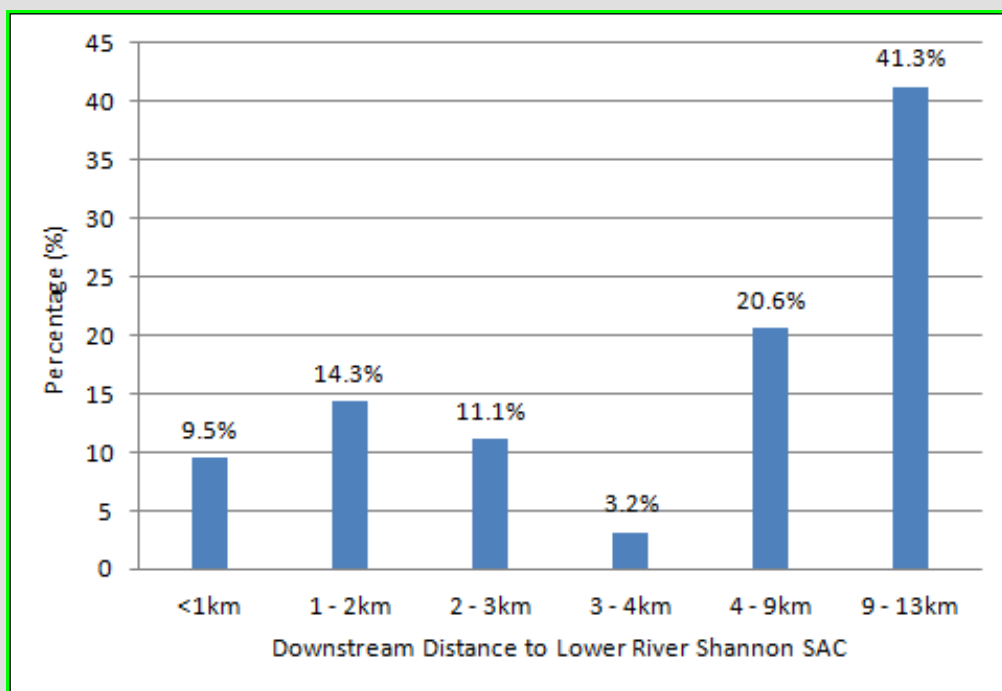
The Lower River Shannon SAC encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments, and the marine area between Loop Head and Kerry Head.

UWF Grid Connection: The Mountphilips Substation site and the majority of the 110kV UGC (26.3km of the total 27.5km) 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 three locations; where the 110kV UGC crosses the Newport River (Watercourse Crossing W10) and where the 110kV crosses the Bilboa River (Watercourse Crossing W57). Horizontal directional drilling will be undertaken at the two river crossing locations to avoid direct impacts on the watercourse/SAC).

The third location relates to a c.70m section of the 110kV UGC which is routed along an existing farm track on the western side of the Newport (Mulkear) River as the route approaches the western river bank. The farm track runs within 50m of the Newport (Mulkear) River channel at this location.

In total, within the River Shannon catchment, there are 64 no. (of 66 no.) watercourse crossings (inclusive of the Newport (Mulkear) River and Bilboa River crossings) along the 110kV UGC route. As shown on Graph 11-1, the majority (~62%) of the watercourse crossings are at least 4km upstream of the Lower River Shannon SAC, with ~41% being more than 9km upstream of the SAC.

Graph 11-1: Downstream Distance from the 110kV UGC Watercourse Crossing Locations to the Lower River Shannon SAC



Please Note: The 24 no. watercourse crossings along the UWF Grid Connection haul route access roads AR1 to AR8 are scoped out for further assessment because the culverts/bridges are existing, and no works are required. No impacts on surface water quality in the Lower River Shannon SAC are expected.

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.

11.5.2.3.2 Element 2: UWF Related Works

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). There is only 1 no. (of the 32 no.) watercourse crossing, with regard to the UWF Related Works, within the River Shannon catchment.

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.

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

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.

Newport Distributor Road (consented) is located within the Newport (Mulkear) River catchment and also located upstream of the Lower River Shannon SAC.

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 Replacement Forestry).

11.5.2.4 Cumulative Information Baseline Characteristics - 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.

11.5.2.5 Cumulative Information Baseline Characteristics - Sensitivity of Lower River Shannon SAC

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

Lower River Shannon SAC	11.5.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)
	<p>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.</p>
Sensitive Aspect	11.5.2.7 Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)
	<p>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.</p>
Topic	

11.5.3 Cumulative Information: PROJECT DESIGN MEASURES for Lower River Shannon SAC

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 Related Works and UWF Other Activities and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in [Appendices 5.3 and 5.4](#) in [Volume C4: EIAR Appendices](#).

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

11.5.4 Cumulative Information: EVALUATION OF IMPACTS to Lower River Shannon SAC

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Lower River Shannon SAC**, see Section 11.5.1.

This Section evaluates the likely cumulative effects of the Other Elements of the Whole UWF Project and Other Projects or Activities. This evaluation is based on the residual effects of the Other Elements of the Whole UWF Project and of Other Projects.

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 11-39: 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)	<i>Surface Water Quality Impacts due to Nutrient Input (construction stage)</i>
Surface water quality impacts due to earthworks (excavations and overburden storage)	<i>Increased flood risk (Operational Stage)</i>
Surface water quality impacts from dewatering of excavations (Construction Stage)	<i>Suspended Solid Input (Operational Stage)</i>
Surface water quality impacts from watercourse crossing works (Construction Stage)	<i>Decommissioning Stage Effects</i>
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 11.5.4.7.**

Cumulative evaluation with Other Projects is presented in Section 11.5.4.8.

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 11.5.4.9.

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

Evaluation of UWF Replacement Forestry Excluded: The UWF Replacement Forestry lands occur outside both the boundary of the Lower River Shannon SAC and the River Shannon regional catchment area, therefore there is no potential for UWF Replacement Forestry to cause water quality effects to the Lower River Shannon SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction stage
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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

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

Element 1: UWF Grid Connection

Impact Magnitude:

Small areas of coniferous forestry at various locations along the 110kV UGC will be permanently felled to facilitate the construction and operation of the 110kV UGC. In total, 1.3 hectares of forestry will be felled within River Shannon catchment.

Given the small area of the overall felling and the distributed nature of the felling within several local sub-catchments 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;
- Relatively small felling area (~1.3ha in total) along the 110kV UGC;
- The largest individual felling area of 1.2ha, which is located in the Small River catchment at Castlewaller, is located approximately 7km upstream of the Lower River Shannon SAC;
- All felling will be carried out under a felling license (Project Design Measure); and,
- All effects will be brief to temporary in natural and reversible.

Element 2: UWF Related Works

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

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

Lower River Shannon SAC	Element 4: Upperchurch Windfarm
	<u>Impact Magnitude</u> : None
	<u>Significance of the Impact</u> : No impact
	<u>Rationale for Impact Evaluation</u> : • No tree felling required for the UWF Related Works within the River Shannon catchment
	Element 5: UWF Other Activities – <i>N/A, evaluated as excluded, see Section 11.5.2.2.1</i>
	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 <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).
	Other Project: Bunkimalta Windfarm and Newport Distributor Road - Please refer to Section 11.5.4.8 for cumulative information
	Evaluation of Cumulative Impacts – Surface water quality impacts due to tree felling
	All Elements of the Whole UWF Project
Sensitive Aspect	<u>Cumulative Impact Magnitude</u> : No potential for effects cumulatively with the Other Elements of the Whole UWF Project – tree felling in conifer plantations within the River Shannon catchment is only required for the UWF Grid Connection.
	Significance of the Cumulative Impact: No Cumulative Impact
	<u>Rationale for Cumulative Impact Evaluation</u> : • Conifer tree felling requirements for the Whole UWF Project within the River Shannon catchment are only required for the 110kV UGC, and therefore there is no potential for cumulative effects with the other elements of the Whole UWF Project
	All Elements of the Whole UWF Project with Other Projects or Activities - Please refer to Section 11.5.4.8 for cumulative evaluation

Water
Topic

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

Evaluation of UWF Replacement Forestry Excluded: The UWF Replacement Forestry lands occur outside both the boundary of the Lower River Shannon SAC and the River Shannon regional catchment area, therefore there is no potential for UWF Replacement Forestry to cause water quality effects to the Lower River Shannon SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction stage
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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 arising 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

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 (26.3km of 27.5km), joint bays (38 no.), temporary access roads (9.23km of 9.3km), permanent access roads (3.94km of 4.4km), temporary compounds (2 no.) and the Mountphilips Substation and End Masts. In total, up to 8,370m³ of overburden will be permanently stored within the construction works area as linear berms and up to 5,020m³ will be temporarily stored for later reinstatement along the construction works area, and upto 11,140m³ will be temporarily excavated for later reinstatement of the construction works areas. Erosion of these storage areas potentially could result is surface water quality impacts on the downstream SAC.

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 26.3km) within the River Shannon catchment;
- As discussed above, the vast majority (~62%) of the 110kV UGC route is at least 4km upstream of the Lower River Shannon SAC, with ~42% being more than 9km upstream of the SAC;

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

<div>Lower River Shannon SAC</div> <div>Sensitive Aspect</div>	<ul style="list-style-type: none"> • There are 24 no. designated temporary overburden storages areas over the length of the 110kV UGC within the River Shannon catchment, but less than 6 no. will only be present at any time; • There will be no temporary or permanent storage areas within 50m of a Class 1 or Class 2 watercourse (Project Design Measure); • There will be no storage within 100m of the Newport (Mulkear) River and the Bilboa River crossing locations which are within the lower River Shannon SAC (Project Design Measure); • The permanent storage berms will be seeded immediately after emplacement thereby reducing erosion and water quality effects; • The majority of the watercourses intercepted by the works area are drains or marginal headwater watercourses with no or low flows, and therefore the effectiveness of them acting as a surface water flowpath 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 11.2.4.3, 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 due to the larger downstream distance and dilution capacity of local surface water bodies; • Only temporary works are required for the section of the 110kV within the SAC (adjacent to the Newport (Mulkear) River), and the route is along an existing farm track; and, • All effects will be brief to temporary in duration and reversible.
	<p>Element 2: UWF Related Works</p>
	<p><u>Impact Magnitude:</u></p> <p>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.</p> <p>Temporary storage of overburden relating to excess material excavated from the Internal Windfarm Cabling within the River Shannon catchment will amount to approximately 498m³ of material. No permanent storage of overburden is proposed within the Lower River Shannon catchment.</p> <p>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.</p>
	<p><u>Significance of the Impact:</u> Imperceptible</p>
<div>Water</div> <div>Topic</div>	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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
	<p>Element 4: Upperchurch Windfarm</p>
	<p><u>Impact Magnitude:</u></p> <p>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.</p>
	<p><u>Significance of the Impact:</u> Not Significant</p>
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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

(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 Replacement Forestry).

Other Project: Bunkimalta Windfarm and Newport Distributor Road

- Please refer to Section 11.5.4.8 for cumulative information

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

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:

Impacts on the Lower River Shannon SAC relating to earthworks and groundworks are more likely to occur downstream of the UWF Grid Connection. However, effects will be brief to temporary.

Due to the fact that the majority of the UWF Related Works and Upperchurch Windfarm are located in the River Suir catchment, while the majority of the UWF Grid Connection is located within the River Shannon catchment, the 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;
- 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);
- 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 11.5.4.8 for cumulative evaluation

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

Evaluation of UWF Replacement Forestry Excluded: The UWF Replacement Forestry lands occur outside both the boundary of the Lower River Shannon SAC and the River Shannon regional catchment area, therefore there is no potential for UWF Replacement Forestry to cause water quality effects to the Lower River Shannon SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction stage
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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

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

Element 1: UWF Grid Connection

Impact Magnitude:

Based on the trial pit investigation and boreholes undertaken along the 110kV UGC, significant groundwater inflows into the cable trench are only likely to occur within the floodplain of the Newport (Mulkear) River, Clare River and Bilboa River.

The River Shannon SAC extends as far upstream as the Newport (Mulkear) River and Bilboa River watercourse crossing locations and therefore water quality effects as a result of localised runoff is likely. The Clare River crossing exists approximately 7km upstream of the River Shannon SAC.

Trial holes undertaken along the rest of the route were dry and small inflows may arise during heavy rainfall from runoff depending on the local topography. No significant groundwater inflows are expected.

Given that all 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 Extremely High Importance of the SAC;
- There will be no direct discharge of pumped water into any watercourse or drain (Project Design Measure);
- Where larger groundwater inflow volumes are expected (i.e. Newport (Mulkear), Clare and Bilboa floodplains) an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster will be used to treat pumped water prior to discharge (Project Design Measure);

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

Lower River Shannon SAC	<ul style="list-style-type: none"> At the Clare River crossing location, the Lower River Shannon SAC exists ~7km downstream of the crossing location, and therefore no effects are likely; and, All effects will be localised, brief to temporary in duration and reversible.
	Element 2: UWF Related Works
	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: <ul style="list-style-type: none"> No dewatering with respect to the UWF Related Works are anticipated.
	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: <ul style="list-style-type: none"> 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
Sensitive Aspect	Cumulative Information: Individual Evaluations of Other Projects or Activities (Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).
	Other Project: Bunkimalta Windfarm and Newport Distributor Road - Please refer to Section 11.5.4.8 for cumulative information
	Evaluation of Cumulative Impacts – Surface water quality impacts from dewatering of excavations
	All Elements of the Whole UWF Project
	Cumulative Impact Magnitude: The potential for impact will be limited to main watercourse crossings along the 110kV UGC (i.e. Newport (Mulkear) River, Clare River and Bilboa River). These watercourse crossings all exists within the River Shannon catchment, and therefore the impact magnitude will be per as the UWF Grid Connection which is Negligible
Topic	Significance of the Cumulative Impact: Imperceptible
	Rationale for Cumulative Impact Evaluation: <ul style="list-style-type: none"> No significant excavation dewatering within the River Shannon catchment relating to the UWF Related Works or Consented UWF Turbines are expected; Potential effects of excavation dewatering on the Lower River Shannon SAC are expected to be limited to the Newport (Mulkear) River, Bilboa River watercourse crossing locations and possibly downstream of the Clare River crossing location;

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

Lower River Shannon SAC	<ul style="list-style-type: none"> • Given that all pumped water will be treated and then discharged at a location away from any local watercourses (Project Design Measure), no significant effects are expected; and, • All effects will be localized and brief to temporary in nature.
	<p>All Elements of the Whole UWF Project with Other Projects or Activities</p> <ul style="list-style-type: none"> - <i>Please refer to Section 11.5.4.8 for cumulative evaluation</i>
Sensitive Aspect	
Topic	Water

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

Evaluation of UWF Replacement Forestry Excluded: The UWF Replacement Forestry lands occur outside both the boundary of the Lower River Shannon SAC and the River Shannon regional catchment area, therefore there is no potential for UWF Replacement Forestry to cause water quality effects to the Lower River Shannon SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction stage
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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

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

Element 1: UWF Grid Connection

Impact Magnitude: Approximately 26.3km of the total 27.5km 110kV UGC is located within the River Shannon Catchment. There are 64 no. watercourse crossings within the River Shannon catchment and in-stream works will be required at 38 no. of these locations. Water quality effects can potentially occur occasionally downstream during the crossing works.

Due to the large downstream distance from the majority of the construction 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;
- There will be no direct effects on the River Shannon River SAC in terms of in-stream works as all the in-stream work locations are upstream of the SAC along headwater watercourses;
- As discussed above, the vast majority (~62%) of the route is at least 4km upstream of the Lower River Shannon SAC, with ~42% being more than 9km upstream of the SAC;
- The majority of the watercourses intercepted by the UWF Grid Connection upstream of the SAC are drains or marginal watercourses which have typically low flows or no 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 significant because (1) the large geographical distribution

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

Lower River Shannon SAC	Sensitive Aspect	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);
		<ul style="list-style-type: none"> The transient nature of the watercourse crossing works within local surface water bodies upstream of the SAC; All effects will be brief to temporary in nature and reversible.
		Element 2: UWF Related Works
		Impact Magnitude: There is only 1 no. watercourse crossing in relation to the UWF Related Works and therefore no effects on the SAC are expected (i.e. there is an overlap of watercourse crossings at this location). No impacts are expected.
		Significance of the Impact: No Impact
		Rationale for Impact Evaluation: <ul style="list-style-type: none"> There is only 1 no. watercourse crossing for the UWF Related Works in the River Shannon catchment and therefore no impacts are expected.
		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: <ul style="list-style-type: none"> There is no watercourse crossing relating to Upperchurch Windfarm in the River Shannon catchment.
Water	Topic	Element 5: UWF Other Activities – <i>N/A, evaluated as excluded, see Section 11.5.2.2.1</i>
		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 <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).
		Other Project: Bunkimalta Windfarm and Newport Distributor Road - Please refer to Section 11.5.4.8 for cumulative information
		Evaluation of Cumulative Impacts – Surface water quality impacts from watercourse crossing works
		All Elements of the Whole UWF Project
		Cumulative Impact Magnitude: The impact magnitude will largely be as per the watercourse crossing works for the UWF Grid Connection. The magnitude of impact will be Negligible.
		Significance of the Cumulative Impact: Imperceptible
		Rationale for Cumulative Impact Evaluation: <ul style="list-style-type: none"> As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC, Watercourse crossings within the River Shannon are almost exclusively associated with the 110kV UGC.
		All Elements of the Whole UWF Project with Other Projects or Activities - Please refer to Section 11.5.4.8 for cumulative evaluation

11.5.4.5 Impact Evaluation Table: Surface water quality impacts during directional drilling works

Evaluation of UWF Replacement Forestry Excluded: The UWF Replacement Forestry lands occur outside both the boundary of the Lower River Shannon SAC and the River Shannon regional catchment area, therefore there is no potential for UWF Replacement Forestry to cause water quality effects to the Lower River Shannon SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction stage
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Cumulative Impact Source: No sources 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 on the Lower River Shannon SAC as a result of the directional drilling works at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossings. Directional drilling under the river bed will be undertaken to prevent direct impacts on the rivers (and Lower River Shannon SAC which stretches upstream of the Newport (Mulkear) River, Bilboa River crossing location). However, there is a risk of indirect impacts from sediment laden runoff during the launch pit, and reception pit excavation works. Frac-out during drilling also has the potential to impact on surface water quality.

There will be no requirement to undertake drilling at any other location along either the Newport (Mulkear) River, Clare River or Bilboa River

Impact Quality: Negative

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

Element 1: UWF Grid Connection

Impact Magnitude:

Given that all runoff will be treated and then discharged at a location away from the Newport (Mulkear) River, Bilboa River and Clare River (Project Design Measure), 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;
- Minimal ground levelling work will be required for the working platform area, and therefore generation of sediment laden runoff is not expected;
- Excavation work will mainly only be required for the launch pit and reception pit;
- The launch pit and reception pit will not have to be kept free of water, and therefore no pumping will be required (no risk of discharge entering the watercourse);
- The ground on either side of both watercourses is relatively flat, and therefore there is a low risk of runoff from the works areas getting into the watercourse;
- All runoff from the works area will be collected and pumped to an infiltration trench or settlement pond (Project Design Measure);
- There will be no direct discharge of any treated water to local watercourses;

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

Lower River Shannon SAC	<ul style="list-style-type: none"> • Effects will be temporary in duration and reversible; and, Based on the directional drilling assessment, the potential for frac-out is considered to be low.
	Element 2: UWF Related Works
	<u>Impact Magnitude</u> : None
	<u>Significance of the Impact</u> : No impact
	<u>Rationale for Impact Evaluation</u> :
	<ul style="list-style-type: none"> • No works in proximity to rivers or drilling works at other types of watercourses will be required.
	Element 4: Upperchurch Windfarm
	<u>Impact Magnitude</u> : None
	<u>Significance of the Impact</u> : No impact
	<u>Rationale for Impact Evaluation</u> :
Sensitive Aspect	<ul style="list-style-type: none"> • No works in proximity to rivers or drilling works at other types of watercourses will be required.
	Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 11.5.2.2.1
	<u>Cumulative Information: Individual Evaluations of Other Projects or Activities</u> (Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is <u>no potential for cumulative effects with the UWF Replacement Forestry</u>).
	Other Project: Bunkimalta Windfarm and Newport Distributor Road - Please refer to Section 11.5.4.8 for cumulative information
	Evaluation of Cumulative Impacts – Surface water quality impacts during directional drilling works
	All Elements of the Whole UWF Project
	<u>Cumulative Impact Magnitude</u> : No potential for effects cumulatively with the Other Elements of the Whole UWF Project – drilling works within the River Shannon catchment is only required for the UWF Grid Connection.
	<u>Significance of the Cumulative Impact</u>: No Cumulative Impact
	<u>Rationale for Cumulative Impact Evaluation</u> :
Topic	<ul style="list-style-type: none"> • There will be no requirement to undertaken drilling for any other element of the Whole UWF Project, and therefore there is no potential for in-combination whole project effects on the River Shannon SAC
	All Elements of the Whole UWF Project with Other Projects or Activities - Please refer to Section 11.5.4.8 for cumulative evaluation
Water	

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

Evaluation of UWF Replacement Forestry Excluded: The UWF Replacement Forestry lands occur outside both the boundary of the Lower River Shannon SAC and the River Shannon regional catchment area, therefore there is no potential for UWF Replacement Forestry to cause water quality effects to the Lower River Shannon SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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) Construction stage

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

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 area is significantly upstream of the SAC (with the exception of the Newport (Mulkear) River and Bilboa River crossing), 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 with the exception of the crossing works at the Newport (Mulkear) River, Clare River and Bilboa River (Project Design Measure);
- All runoff from the Newport (Mulkear) River, Clare River and Bilboa River crossing works will be contained and treated for sediment. Therefore in the unlikely event of an oil/fuel spill or leak, any contaminated water can be contained and removed off-site (Project Design Measure);

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

Sensitive Aspect	Lower River Shannon SAC	<ul style="list-style-type: none"> 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; and, <p>All runoff from the Newport (Mulkear) River, Clare River and Bilboa River crossings will be contained for sediment treatment (Project Design Measure), therefore in the unlikely event of a major spill or leak, any contaminated water can be contained and removed off-site (Project Design Measure).</p>
		Element 2: UWF Related Works
		<u>Impact Magnitude</u> : 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.
		<u>Significance of the Impact</u> : No Impact
		<u>Rationale for Impact Evaluation</u> :
		<ul style="list-style-type: none"> The volumes on-site will be very small, and therefore no effects are expected.
		Element 4: Upperchurch Windfarm
		<u>Impact Magnitude</u> : 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.
		<u>Significance of the Impact</u> : Not Significant
		<u>Rationale for Impact Evaluation</u> :
Water	Topic	<ul style="list-style-type: none"> 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 Cumulative Impacts – Water quality impacts from fuels, oils and chemicals
		All Elements of the Whole UWF Project
		<u>Cumulative Impact Magnitude</u> :
		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.
		<u>Significance of the Cumulative Impact</u>: Imperceptible
		<u>Rationale for Cumulative Impact Evaluation</u> :
		<ul style="list-style-type: none"> 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 <u>Other Projects or Activities</u> is included in the table above, because <u>all</u> of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.5.2.2.1).

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

Evaluation of UWF Replacement Forestry Excluded: The UWF Replacement Forestry lands occur outside both the boundary of the Lower River Shannon SAC and the River Shannon regional catchment area, therefore there is no potential for UWF Replacement Forestry to cause water quality effects to the Lower River Shannon SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction stage
<p><u>Cumulative Impact Source:</u> Cement based compounds</p> <p><u>Impact Pathway:</u> Runoff and surface water flowpaths</p> <p><u>Impact Description:</u> 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.</p> <p><u>Impact Quality:</u> Negative</p>	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
<p><u>Impact Magnitude:</u></p> <p>Given that the worst-case effects on local surface water bodies has been assessed to be Negligible (see Section 11.2.4.8) and the fact that the majority of the UWF Grid Connection construction works area is significantly upstream of the SAC with the exception of the Newport (Mulkear) River and Bilboa River crossing (where no in-stream works are proposed), the worst-case effect on the SAC is considered to be Negligible.</p>	
<p><u>Significance of the Impact:</u> Imperceptible</p>	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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; • The volume of cement that will be used within the 70m section of the cable trench within the SAC will be very small; and, • No in-streams works are at the Newport (Mulkear) River and Bilboa River crossings (which are located within the SAC), and therefore there will be no placement of cement within the river channels. 	

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

Lower River Shannon SAC	Sensitive Aspect	Element 2: UWF Related Works
		<u>Impact Magnitude:</u> The use of cement-based compounds will be limited to the Telecom Relay Pole foundation (c.4m ³) and 9 no. road crossings. Therefore, no impacts on surface water quality are anticipated.
		<u>Significance of the Impact:</u> No Impact
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none">• The volumes of cement used for the UWF Related Works within the River Shannon catchment will be negligible.
		Element 4: Upperchurch Windfarm
		<u>Impact Magnitude:</u> 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.
		<u>Significance of the Impact:</u> Not Significant
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none">• 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; and,• 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 Cumulative Impacts – Water quality impacts from cement-based compounds
		All Elements of the Whole UWF Project
		<u>Cumulative Impact Magnitude:</u> 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.
		<u>Significance of the Cumulative Impact:</u> Imperceptible
		<u>Rationale for Cumulative Impact Evaluation:</u> <ul style="list-style-type: none">• 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 UWF Related Works and Upperchurch Windfarm will also be very small; and,• Any spills that do occur are likely to be small isolated incidents and therefore the potential for cumulative effects is negligible.
Water	Topic	Note: No cumulative evaluation of <u>Other Projects or Activities</u> is included in the table above, because <u>all</u> of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 11.5.2.2.1).

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

Evaluation of UWF Replacement Forestry Excluded: The UWF Replacement Forestry lands occur outside both the boundary of the Lower River Shannon SAC and the River Shannon regional catchment area, therefore there is no potential for UWF Replacement Forestry to cause water quality effects to the Lower River Shannon SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction Stage
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Cumulative Source: Tree felling, 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 mainly with the UWF Grid Connection (110kV UGC) element of the Whole UWF Project, the Bunkimalta Windfarm and the Newport Distributor Road construction.

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:

26.3km (of 27.5km) of the 110kV UGC are located within the River Shannon catchment and upstream of the Lower River Shannon SAC

Due to the large geographical spread and transient nature of the works within the River Suir catchment, the relatively large downstream distance from the majority of the works to the SAC and the Project Design Measures, 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 (latitudinal distance of >26.3km) within the River Shannon catchment;
 - As discussed above, the vast majority (~70%) of the 110kV UGC route is at least 4km upstream of the Lower River Shannon SAC, with ~42% being more than 9km upstream of the SAC;
 - The majority of the watercourses intercepted by the works area are drains or marginal headwater watercourses with no or low flows, and therefore the effectiveness of them acting as a surface water flowpath 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 summarised in Section 11.2.4.11, 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 2: UWF Related Works

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.

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

Lower River Shannon SAC	Sensitive Aspect	<u>Significance of the Impact:</u> Imperceptible
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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); and, • The effects are likely to be brief to temporary in duration and reversible in nature.
		Element 4: Upperchurch Windfarm
		<u>UWF Impact Magnitude:</u> 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..
Water	Topic	<u>Significance of the Impact:</u> Not Significant
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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
		<u>Other Project: Bunkimalta Windfarm</u>
		<u>Bunkimalta Impact Magnitude:</u> 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.
		<u>Significance of the Impact:</u> Not Significant, as reported in the Bunkimalta WF EIS (2013)
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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;
		<u>Other Project: Newport Distributor Road</u>
		<u>Impact Magnitude:</u> Localised work adjacent to the Newport River downstream of Newport town. Road development includes surface water drainage system and attenuation tanks.
		<u>Significance of the Impact:</u> Not Significant
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • As per planning conditions surface water controls will be in place
		Evaluation of Cumulative Impacts – Surface Water Quality Effects from Suspended Sediments
		<u>Cumulative Impact Magnitude:</u> Negligible
		<u>Significance of the Cumulative Impact:</u> Imperceptible
		<u>Rationale for Cumulative Impact Evaluation:</u>

- The transient nature of the 110kv UGC works upstream of the SAC;
- The small scale of the UWF Related Works and 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 (~650km²) 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.

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

11.5.4.9 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 11-40 below.

Table 11-40: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway(s)</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Construction Stage				
Tree felling in Conifer Plantations Afforestation	1, 2, 4	SW Runoff	Surface Water Quality due to Nutrient Input	<p>Rationale for Excluding: Neutral effect.</p> <p>The surface water quality effects on local surface water bodies from sedimentation as a result of tree felling for the <u>UWF Grid Connection</u> and <u>UWF Related Works</u> were assessed to be imperceptible to slight (refer 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.</p> <p>The <u>Upperchurch Windfarm</u> 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.</p>
Operational Stage				
Runoff from Permanent hardstanding and flood risk from permanent watercourse crossing culverts	1, 2, 4	SW Flowpaths	Increased flood risk	<p>Rationale for Excluding: Neutral effect.</p> <p>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 been 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 11.2.4.9) 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 11.2.4.10). As such, effects on the downstream SACs will be Neutral.</p>
Surface water quality	1, 2, 4	SW Flowpaths	Suspended solid input	Rationale for Excluding: Neutral effect.

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway(s)</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
impacts from runoff from permanent hardstanding surfaces				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 11.2.4.10), therefore effects on the downstream SACs are considered to be Neutral.
Decommissioning Stage Effects				
<p>Rationale for Excluding: Scoped Out, no potential for impacts/Neutral impacts</p> <p>The <u>UWF Grid Connection</u> will remain part of the National Grid. Therefore no hydrological impacts are expected.</p> <p><u>UWF Related Works</u>: 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.</p> <p><u>Upperchurch Windfarm</u>: It is likely that the Consented UWF Substation will remain in-situ for use by ESNB 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.</p>				

Lower River Shannon SAC

Sensitive Aspect

Water

Topic

11.5.5 Mitigation Measures for Impacts to Lower River Shannon SAC

Mitigation measures are not relevant as there is **no potential for UWF Replacement Forestry to cause impacts** to Lower River Shannon SAC.

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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Replacement Forestry (Section 11.5.1), i.e. **no potential for impacts**.

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

Best Practice Measures are not applicable, as the UWF Replacement Forestry has no potential to cause any effects to the Lower River Shannon SAC.

11.5.8 Summary of Impacts to the Lower River Shannon SAC

No impacts to the Lower River Shannon SAC are concluded by the topic authors as likely to occur as a consequence of the development of UWF Replacement Forestry.

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 11-41: 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	from directional drilling works	fuels, oils and chemicals	from cement-based compounds
Evaluation Impact Table <i>(for Other Elements only)</i>	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	Section 11.5.4.7
Project Life-Cycle Stage <i>(for Other Elements only)</i>	Construction	Construction	Construction	Construction	Construction	Construction	Construction
<u>UWF Replacement Forestry</u>	No Potential for Impacts: Evaluated as Excluded, see Section 11.5.1						
Element 1: UWF Grid Connection	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible
Element 2: UWF Related Works	No Impact	Imperceptible	No Impact	No Impact	No Impact	No Impact	No Impact
Element 4: Upperchurch Windfarm	No Impact	Not Significant	Not Significant	No Impact	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						
<u>Cumulative Impact:</u> <i>(for Other Elements only)</i>							
All Elements of the Whole UWF Project	No Cumulative Impact	Imperceptible	Imperceptible	Imperceptible	No Cumulative Impact	Imperceptible	Imperceptible
All Elements of the Whole UWF Project <i>and</i> Other Projects Bunkmalta Windfarm Newport Distributor Road	Imperceptible— See Section 11.5.4.8 <u>Please Note:</u> 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 Replacement Forestry).					N/A - evaluated as excluded, see Section 11.5.2.2.1	

Sensitive Aspect	Lower River Shannon SAC
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Topic	Water
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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 Replacement Forestry is described in Table 11-42 and illustrated on Figure RF 11.6: Lower River Suir SAC within UWF Replacement Forestry Study Area (Volume C3 EIAR Figures).

Table 11-42: UWF Replacement Forestry 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 Replacement Forestry 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 Clodiagh³ River, Multeen River and Owenbeg River downstream of the development are within the Lower River Suir SAC.

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.

11.6.1.3 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 the 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 Clodiagh River (Clodiagh_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.

³ 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.

Lower River Suir SAC	11.6.1.5 Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	
	<p>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.</p> <p>The SWBs are also reported to be “Not At Risk” from forestry related sediment input.</p>	
Sensitive Aspect	11.6.1.6 Receiving Environment (the Baseline + Trends)	
	<p>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.</p>	

Topic	Water
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11.6.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

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

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

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

11.6.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Lower River Suir SAC 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 11.6.2.2.1** below.

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 Replacement Forestry 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. 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 Replacement Forestry or the Other Elements of the Whole UWF Project, and therefore no Other Projects or Activities are scoped in for cumulative effects to Lower River Suir SAC.

11.6.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Replacement Forestry Study Area along with the study areas for Other Elements which are described in Table 11-43.

Table 11-43: 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 and therefore at this scale, the Whole Windfarm Project would likely have a Neutral effect in relation to cumulative impacts
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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

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 and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Lower River Suir SAC. The results of this evaluation are included in Table 11-44.

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 11.6: Lower River Suir SAC within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 11-44: Results of the Evaluation of the Other Elements of the Whole UWF Project

Cumulative Element/Project/Activity	Results of the evaluation of the Other Elements
Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Included</u> for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	<u>Included</u> for the evaluation of cumulative effects
Element 5: UWF Other Activities	<p><u>Evaluated as excluded</u>: Neutral effect/No potential for effects due to:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

11.6.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.6.2.3.1 Element 1: UWF Grid Connection

Within the River Suir catchment, the last c.1.2km 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 at least 12km upstream of the River Suir SAC.

11.6.2.3.2 Element 2: UWF Related Works

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).

11.6.2.3.3 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.

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.

Lower River Suir SAC

Sensitive Aspect

Water

Topic

11.6.3 PROJECT DESIGN MEASURES for Lower River Suir SAC

At the conception of the UWF Replacement Forestry, 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 11-45 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect **Lower River Suir SAC**.

Table 11-45: UWF Replacement Forestry Project Design Measures relevant to Lower River Suir SAC

PD ID	Project Design Environmental Protection Measure (PD)
RF-PD 02	The lands will be planted by hand, using spades and hand tools.
RF-PD 03	No pesticide or fertilizer will be used at the UWF Replacement Forestry site.
RF-PD 04	There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the site/
RF-PD 05	A water setback from the watercourse which flows through the site will be established during planting works. The setback will be 10m from the edge of the watercourse. No planting or other works will be carried out in this 10m wide buffer area. Native woodland will be planted beyond this distance in accordance with Silvicultural Standards for Native Woodland Establishment GP9 & GP10 (Department of Agriculture, Food and the Marine, 2015).

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 Related Works and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in **Appendices 5.3, 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 Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project are identified and evaluated.

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

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

Table 11-46: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
Surface water quality impacts due to tree felling of conifer plantation. (construction stage)	<i>Excavation Dewatering (construction stage)</i>
Surface water quality impacts due to earthworks (excavations and overburden storage), (construction stage)	<i>Nutrient input due to tree felling (construction stage)</i>
Surface water quality impacts from watercourse crossing works, (construction stage)	<i>Increased Flood Risk (operational stage)</i>
Water quality impacts from fuels, oils and chemicals, (construction stage)	<i>Suspended Sediment Input (operational stage)</i>
Water quality impacts from cement-based compounds, (construction stage)	<i>Decommissioning Stage Effects</i>

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

Evaluation of UWF Replacement Forestry Excluded: As there is no felling of conifers will be required for the UWF Replacement Forestry project, there is no potential for UWF Replacement Forestry to cause surface water quality effects to Lower River Suir SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)

Construction stage

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

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 2: UWF Related Works

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.

Lower River Suir SAC

Sensitive Aspect

Water

Topic

Element 4: Upperchurch Windfarm
<p><u>Impact Magnitude:</u> 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.</p>
<p><u>Significance of the Impact:</u> Not Significant</p>
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 Cumulative Impacts – Surface water quality impacts due to tree felling
All Elements of the Whole UWF Project
<p><u>Cumulative Impact Magnitude:</u> Cumulative effects relate to the UWF Related Works and the Upperchurch Windfarm. Due to the small felling area associated with the UWF Related Works, the in-combination magnitude of impacts is considered to be Negligible.</p>
<u>Significance of the Cumulative Impact:</u> Imperceptible
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC; • All tree felling associated with the 110kV UGC is located within the River Shannon catchment and all tree felling associated with the Consented UWF Turbines, and UWF Related Works are located within the River Suir catchment, and therefore no in-combination effects can occur; • 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; and, • The area to be felling for the UWF Related Works accounts for only 7% of the Upperchurch Windfarm felling area.

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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

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

Impact Description

Project Life Cycle Stage: Planting stage

Impact Source: planting works

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 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.

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

Element 1: UWF Grid Connection

Impact Magnitude:

Only approximately 1.2km (of the total 27.5km), of the UWF Grid Connection, is located within the River Suir catchment and is more than 12km upstream of the SAC. This will require 1 no. compound, 1 no. joint bay and mainly temporary access roads in addition to the trench. Also, there are no temporary or permanent overburden storage areas required for the UWF Grid Connection within the River Suir catchment, and therefore the potential for effects on the SAC are 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;
- Due to the small scale of the works in the River Suir catchment and the large downstream distance to the SAC.

Lower River Suir SAC

Sensitive Aspect

Water

Topic

Element 2: UWF Related Works

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, Realigned Windfarm Raods and the Telecom Relay Pole works..

Up to 930m³ of overburden will be permanently stored along the internal cabling route as linear berms and up to 10,850m³ 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 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 Cumulative Impacts – Surface water quality impacts due to earthworks

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:

The 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 within the windfarm site and that the majority of the internal windfarm cabling will be located within the Upperchurch Windfarm (and therefore

Lower River Suir SAC	within the capture zone of the windfarm drainage), the impact magnitude on the SAC which is >12km downstream from the majority of the works areas, the impact magnitude is considered to be Negligible .
	Significance of the Cumulative Impact: Imperceptible
Sensitive Aspect	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC; • 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; • 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 of the Windfarm Cabling is within the Upperchurch Windfarm 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 >12km downstream from the majority of the Whole UWF Project; • 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; and, • Approximately 62% of the Internal Windfarm Cabling is located within the footprint of the Upperchurch Windfarm, and therefore runoff will be contained and treated by the consented windfarm drainage.

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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

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

Evaluation of UWF Replacement Forestry Excluded: Existing culvert crossings will be used to access the lands and no instream works will be required for the UWF Replacement Forestry, therefore there is no potential for UWF Replacement Forestry to cause surface water quality effects to Lower River Suir SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction stage
<p><u>Cumulative Impact Source:</u> Watercourse Crossing Works</p> <p><u>Impact Pathway:</u> Runoff and surface water flowpaths</p> <p><u>Impact Description:</u> 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.</p> <p><u>Impact Quality:</u> Negative</p>	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
<p><u>Impact Magnitude:</u> Only Approximately 1.2km 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.</p>	
<u>Significance of the Impact:</u> No Impact	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • The small scale of the works and the fact that the watercourses are only drains. 	
Element 2: UWF Related Works	
<p><u>Impact Magnitude:</u> Approximately 16.2km of the total 17.9km Internal Windfarm Cabling is located within the River Suir catchment. 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 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.</p>	
<u>Significance of the Impact:</u> Imperceptible	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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; 	

Lower River Suir SAC

Sensitive Aspect

Water

Topic

Lower River Suir SAC	Sensitive Aspect	<ul style="list-style-type: none"> • 26 no. of the total 31 no. watercourse crossings are at least 12km upstream of the SAC with the others 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 the 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.
		<p>Element 4: Upperchurch Windfarm</p> <p><u>Impact Magnitude:</u> 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.</p> <p><u>Significance of the Impact:</u> No Impact</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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. <p>Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 11.6.2.2.1</p>
Water	Topic	<p>Evaluation of Cumulative Impacts – Surface water quality impacts from watercourse crossing works</p> <p>All Elements of the Whole UWF Project</p> <p><u>Cumulative Impact Magnitude:</u> Cumulative effects relate to the UWF Related Works and the Upperchurch Windfarm. There is an overlap of watercourse crossings with respect to the UWF Related Works and the Upperchurch Windfarm (the 1 no. watercourse crossings for the Upperchurch Windfarm will also satisfy the UWF Related Works). 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 Negligible.</p> <p><u>Significance of the Cumulative Impact:</u> Imperceptible</p> <p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC; • Watercourse crossing within the River Suir are almost exclusively 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 12km upstream of the Lower River Suir SAC.
		<p>Note: No cumulative information for <u>Other Projects or Activities</u> is included in the table above, because <u>no</u> Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).</p>

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

Lower River Suir SAC

Sensitive Aspect

Water

Topic

Impact Description	
Project Life Cycle Stage:	Planting 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 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: <ul style="list-style-type: none"> 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. 	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
Impact Magnitude: Only 1.2km of the UWF Grid Connection is located within the River Suir catchment, and no effects on the downstream SAC are likely due to the small scale, the downstream distance to the SAC (>12km), 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: <ul style="list-style-type: none"> 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 2: UWF Related Works	
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. 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	

Lower River Suir SAC	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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
	<p>Element 4: Upperchurch Windfarm</p>
Sensitive Aspect	<p><u>Impact Magnitude:</u></p> <p>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.</p>
	<p><u>Significance of the Impact:</u> Not Significant</p>
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • A Fuel and Oil Management Plan will be implemented during the construction of the Upperchurch Windfarm which will storage requirements and emergency procedures for dealing with any spills and leaks.
	<p>Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 11.6.2.2.1</p>
	<p>Evaluation of Cumulative Impacts – Water quality impacts from fuels, oils and chemicals</p>
Water	<p>All Elements of the Whole UWF Project</p>
	<p><u>Cumulative Impact Magnitude:</u></p> <p>The Whole UWF Project has the potential has the potential to impact on the Lower River Suir SAC from oil and fuel usage. Effects are likely to occur rarely and be isolated incidents, and the magnitude of effects is likely to be negligible.</p>
	<p><u>Significance of the Cumulative Impact: Imperceptible</u></p>
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 due to the negligible volumes that will be present on-site; • 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 12km.
	<p>Note: No cumulative information for <u>Other Projects or Activities</u> is included in the table above, because <u>no</u> Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).</p>

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

Evaluation of UWF Replacement Forestry Excluded: As there is no use of cement based compounds required for the UWF Replacement Forestry project, there is no potential for UWF Replacement Forestry to cause water quality effects to Lower River Suir SAC by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction stage
<p><u>Cumulative Impact Source:</u> Cement based compounds</p> <p><u>Impact Pathway:</u> Runoff and surface water flowpaths</p> <p><u>Impact Description:</u> 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.</p> <p><u>Impact Quality:</u> Negative</p>	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
<p><u>Impact Magnitude:</u></p> <p>Only 1.2km of the UWF Grid Connection is located within the River Suir catchment and any effects on the downstream SAC are likely to be negligible due to the small scale, the downstream distance to the SAC (>12km), the transient nature of the works, and the small volumes of cement that will be present on-site.</p>	
<u>Significance of the Impact:</u> Imperceptible	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> 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 2: UWF Related Works	
<p><u>Impact Magnitude:</u></p> <p>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.</p>	
<u>Significance of the Impact::</u> No Impact	
<p><u>Rationale for Impact Evaluation:</u></p> <p>Small scale nature of the works and the downstream distance to SAC (<12km)</p>	
Element 4: Upperchurch Windfarm	

Lower River Suir SAC

Sensitive Aspect

Water

Topic

Sensitive Aspect	Lower River Suir SAC	<p>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.</p> <p>Significance of the Impact: Not Significant</p> <p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> • 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. <p>Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 11.6.2.2.1</p> <p>Evaluation of Cumulative Impacts – Water quality impacts from cement-based compounds</p> <p>All Elements of the Whole UWF Project</p> <p>Cumulative Impact Magnitude: The Whole UWF Project has the potential to impact on the Lower River Suir SAC from cement usage. Effects are likely to occur rarely and be isolated incidents, and the magnitude of effects is likely to be negligible.</p> <p>Significance of the Cumulative Impact: Imperceptible</p> <p>Rationale for Cumulative Impact Evaluation:</p> <ul style="list-style-type: none"> • 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; • 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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

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 Table 11-47 below.

Table 11-47: 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	<p>Rationale for Excluding: no likely impact</p> <p>No excavations required for the UWF Replacement Forestry, therefore no potential for impact.</p> <p>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.</p>
Tree felling in Conifer Plantations Afforestation	1,2,3,4	SW Runoff	Nutrient input due to tree felling	<p>Rationale for Excluding: Neutral Impact</p> <p>The surface water quality effects on local surface water bodies from sedimentation as a result of tree felling for the UWF Grid Connection and 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 drainage design measures.</p> <p>No tree felling/harvesting required for the UWF Replacement Forestry, therefore no potential for impact.</p>
Operational Stage				
Runoff from Permanent hardstanding and flood risk from permanent watercourse crossing culverts	1,2,3,4	SW Flowpaths	Increased flood risk	<p>Rationale for Excluding: Neutral Impact</p> <p>There are no new or upgraded watercourse crossings structures required for the UWF Replacement Forestry, therefore no potential for impacts.</p> <p>There are no watercourse crossing structures proposed within the SAC. All permanent watercourse crossing structures are on small headwater watercourses which are upstream of the SAC. Effects on local surface water bodies with respect to permanent crossings has been assessed to be imperceptible because culverts will be sized to cope with a 100-year flood flow</p>

Lower River Suir SAC

Sensitive Aspect

Water

Topic

Lower River Suir SAC	Sensitive Aspect	Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
						as per the Project Design Measure (see Section 11.2.4.9) 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 11.2.4.10). As such, effects on the downstream SACs will be Neutral.
Water	Topic	Surface water quality impacts from runoff from permanent hardstanding surfaces	1,2,3,4	SW Flowpaths	Suspended solid input	<p>Rationale for Excluding: Neutral Impact</p> <p>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 11.2.4.10), therefore effects on the downstream SAC are considered to be Neutral.</p> <p>No groundworks or excavations required for the UWF Replacement Forestry, therefore no potential for impact.</p>
		<p>Decommissioning Stage</p> <p>Rationale for Excluding: Neutral Impact, or no potential for impact to occur</p> <p><u>UWF Grid Connection</u> will remain part of the National Grid. Therefore no hydrological impacts are expected.</p> <p><u>UWF Related Works</u>: 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.</p> <p>The <u>UWF Replacement Forestry</u> will not be harvested or felled but will remain permanently in place. Therefore no hydrological impacts are expected.</p> <p><u>Upperchurch Windfarm</u>: It is likely that the Consented UWF Substation will remain in-situ for use by ESNB 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.</p> <p>The <u>UWF Other Activities</u> (UWF Hen Harrier Scheme) will finish, but no activities will be required.</p>				

11.6.5 Mitigation Measures for Impacts to Lower River Suir SAC

Mitigation measures were incorporated into the UWF Replacement Forestry 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 Replacement Forestry.

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 Measures

The UWF Replacement Forestry will be planted in accordance with Forest Service Department of Agriculture, Food & the Marine *Felling and Reforestation Policy (2017)*, and Guidance Documents – *Native Woodland Establishment GPC9 and GPC10 Silvicultural Standards (2015)*, *Environmental Requirements for Afforestation (2016)* and *Management Guidelines for Ireland Native Woodlands (2017)*.

Lower River Suir SAC

Sensitive Aspect

Water

Topic

Lower River Suir SAC

Sensitive Aspect

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 11-48.

Table 11-48: 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
<i>Evaluation Impact Table</i>	<i>Section 11.6.4.1</i>	<i>Section 11.6.4.2</i>	<i>Section 11.6.4.3</i>	<i>Section 11.6.4.4</i>	<i>Section 11.6.4.5</i>
Project Life-Cycle Stage	Construction	Planting stage	Construction	Planting stage	Construction
UWF Replacement Forestry	No Potential for Impact	Imperceptible	No Potential for Impact	No Impact	No Potential for Impact
Cumulative Information: Individual Project Evaluations					
Element 1: UWF Grid Connection	No Impact	Imperceptible	No Impact	No Impact	Imperceptible
Element 2: UWF Related Works	Imperceptible	Imperceptible	Imperceptible	Imperceptible	No Impact
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 are likely to cause cumulative effects to the Lower River Suir SAC with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.6.2.1).

Water

Topic

11.7 Sensitive Aspect No.6: Bleanbeg Bog NHA

This Section provides a description and evaluation of the Sensitive Aspect - Bleanbeg Bog NHA.

11.7.1 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

11.7.1.1 Baseline Characteristics of Bleanbeg Bog NHA in relation to UWF Replacement Forestry

Bleanbeg Bog NHA is a 1.3km² area of upland blanket bog that is located approximately 7km east of Newport, Co. Tipperary.

11.7.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Bleanbeg Bog NHA. It was evaluated by the topic authors that **no impacts Bleanbeg Bog NHA are likely to occur** due to the UWF Replacement Forestry, for the following reasons:

- UWF Replacement Forestry site is located outside the NHA boundary, and at a distance of 14.4km to the east of the Bleanbeg Bog NHA.

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

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

UWF Replacement Forestry has no potential to cause impacts to Bleanbeg Bog NHA by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 11.7.2 to Section 11.7.4** and included in the summary table in **Section 11.7.8** in order to show the totality of the project.

Bleanbeg Bog NHA

Sensitive Aspect

11.7.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.7.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Bleanbeg Bog NHA 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 11.7.2.2.1** below.

The evaluation of cumulative impacts to Bleanbeg Bog NHA 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 Bleanbeg Bog NHA with either the UWF Replacement Forestry 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. 11)**.

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Bleanbeg Bog NHA with UWF Replacement Forestry, however in order to present the totality of the project – Turf Cutting (Activity) have been scoped in for evaluation of cumulative effects relating to the Other Elements (in particular the UWF Grid Connection).

11.7.2.2 Cumulative Evaluation Study Area

The study area for the cumulative evaluation is described in Table 11-49.

Table 11-49: Cumulative Evaluation Study Area for Bleanbeg Bog NHA

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	NHA Boundary plus 300m	300m relates to the groundwater flowpath distance. Significant excavation within 300m of Bleanbeg Bog NHA may have the potential to contribute to cumulative impacts.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities: Turf Cutting Please Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project (UWF Grid Connection only). There is no potential for cumulative effects with the UWF Replacement Forestry.		

Water

Topic

11.7.2.2.1 Potential for Impacts to Bleanbeg Bog NHA

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 Bleanbeg Bog NHA. The results of this evaluation are included in Table 11-50.

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 11.7: Bleanbeg Bog NHA within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 11-50: 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	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Evaluated as excluded</u> : No potential for effects due to the separation distance of UWF Related Works from Bleanbeg Bog NHA (c.12km separation distance).
Element 4: Upperchurch Windfarm (UWF)	<u>Evaluated as excluded</u> : No potential for effects due to the location of Upperchurch Windfarm from Bleanbeg Bog NHA (c.12km separation distance).
Element 5: UWF Other Activities	<u>Evaluated as excluded</u> : No potential for effects due to the location of the vast majority of UWF Other Activities outside the boundary of the Bleanbeg Bog NHA – only some Monitoring Activities will take place within the boundary of the NHA and these activities will involve visual inspections which have no potential to cause effects to the NHA.
Other Projects or Activities	
Activity: Turf Cutting	<u>Included</u> 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 (UWF Grid Connection only). There is no potential for cumulative effects with the UWF Replacement Forestry.

11.7.2.3 Cumulative Information: Baseline Characteristics – Context & Character

Bleanbeg Bog NHA is a 1.3km² area of upland blanket bog that is located approximately 7km east of Newport, Co. Tipperary.

11.7.2.3.1 Element 1: UWF Grid Connection

The Bleanbeg Bog NHA only occurs within the UWF Grid Connection study area, where section S38 of the 110kV UGC intersects the NHA for approximately 140m at the extreme south-western corner of the NHA. The route of the 110kV UGC inside the NHA is along an existing forestry track which runs along the NHA boundary and immediately downslope of the bog cutaway face.

The location of the UWF Grid Connection in relation to the Bleanbeg Bog NHA is identified on **Figure GC 11.7: Bleanbeg Bog within the UWF Grid Connection Study Area**. **Figure GC 11.7** is part of the EIA Report for the UWF Grid Connection, and is included in **Volume E: Reference Documents** with this planning application.

Bleanbeg Bog incorporates a broad plateau of upland blanket bog habitat that grades into heath, upland grassland on peaty soil, and cutover bog. The western boundary of the site is defined by the transition from intact blanket bog to cutover bog, while the northern, eastern and southern sides of the site are bounded by conifer plantation. A forestry road is located on its southern boundary. The 110kV UGC is routed along a 140m section of this road.

Sensitive Aspect	Bleanbeg Bog NHA	<p>The route of the UWF Grid Connection (110kV UGC) is downslope of the bog. Runoff from upslope bog crosses the 110kV UGC via 4 discrete drainage channels which run in a southerly direction into the forestry to the south of the NHA. Therefore, any runoff from the construction works areas will flow in a southerly direction into the forestry and away from the bog.</p> <p>Site investigations undertaken along the existing road within the NHA (2 no. trial pits) have shown that the forestry track is underlain by mineral subsoil (>1.4m in depth) comprising SILT and slightly gravelly sandy SILT/CLAY (refer to Chapter 10 – Soils).</p> <p>There is no peat present beneath the 140m section of the 110kV UGC within the NHA. No groundwater table or groundwater inflows were intercepted at the trial hole locations within the NHA which were undertaken in March 2017. Based on topography (and the conceptual model of groundwater flow in low permeability aquifers), it is assumed that the local groundwater flow direction is in a southerly direction, therefore, the 110kV UGC route is down-gradient of the NHA in terms of groundwater flow.</p>
<div>11.7.2.3.2</div> <div>Element 2: UWF Related Works</div> <div>Not applicable – Element evaluated as excluded. See Section 11.7.2.2.1.</div>		
<div>11.7.2.3.3</div> <div>Element 4: Upperchurch Windfarm</div> <div>Not applicable – Element evaluated as excluded. See Section 11.7.2.2.1.</div>		
<div>11.7.2.3.4</div> <div>Element 5: UWF Other Activities</div> <div>Not applicable – Element evaluated as excluded. See Section 11.7.2.2.1.</div>		
<div>11.7.2.3.5</div> <div>Other Projects or Activities: Turf Cutting</div> <div><p>Turf-cutting occur within and immediately adjacent to the NHA boundary.</p><p>Please Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project (UWF Grid Connection only). There is no potential for cumulative effects with the UWF Replacement Forestry).</p></div>		

11.7.2.4 Cumulative Information Baseline Characteristics - Importance of Bleanbeg Bog NHA

Bleanbeg Bog NHA is an upland blanket bog habitat and is considered by the NPWS to have high conservation importance on a national level.

11.7.2.5 Cumulative Information Baseline Characteristics - Sensitivity of Bleanbeg Bog NHA

The hydrology of upland blanket bogs and their water dependent ecosystems are very sensitive to impacts. Draining and cutting damages the hydrology of bog systems; both lead to drying out of the bog surface, loss of the characteristic sphagnum mosses and increases potential for peat erosion.

11.7.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)

It is reported by the NPWS that mainly hand cutting of turf for domestic purposes occurs on the margins of the bog. Sausage machine cutting and associated drainage works and machine tracks have damaged small areas of the bog surface on the north-western and north-eastern edges of the site. Coniferous tree saplings are also invading the bog margins in places. Peat cutting has occurred in the past in the area of the NHA intersected by the UWF Grid Connection.

11.7.2.7 Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)

Bleanbeg Bog is a protected site, and any hydrological changes made by small scale peat cutting will be relatively minor. Species invasion will have a very gradual effect on the hydrological state of the bog. Therefore, it is assumed that the baseline environment identified above will be the receiving environment.

11.7.3 Cumulative Information: PROJECT DESIGN MEASURES for Bleanbeg Bog NHA

The potential for impacts to Bleanbeg Bog NHA is limited to the UWF Grid Connection. Potential or likely significant impacts caused by 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 [Appendix 5.3](#) in [Volume C4: EIAR Appendices](#).

11.7.4 Cumulative Information: EVALUATION OF IMPACTS to Bleanbeg Bog NHA

There are no Project Design Measures for Bleanbeg Bog NHA.

Note: It was evaluated, in Section 11.7.1, that UWF Replacement Forestry has no potential to cause impacts to Bleanbeg Bog NHA.

This Section evaluates the **likely cumulative effects of the Other Elements** of the Whole UWF Project and Other Projects or Activities. This 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) - Bleanbeg Bog NHA.

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

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)
<u>NO</u> Impacts are included for evaluation	Surface water and groundwater Contamination due to Oils, Fuels & Chemicals (construction stage)
	Surface water and groundwater Contamination due to Cement Based Compounds (construction stage)
	Groundwater level and flow impacts (construction stage)
	Operational Stage Effects
	Decommissioning Stage Effects

The source-pathway-receptor links and the rationale for excluded impacts are described in **in the following section 11.7.4.1.**

11.7.4.1 Cumulative Information: 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 11-52 below.

Table 11-52: Description and Rationale for Excluded Impacts to Bleanbeg Bog NHA

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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway(s)</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Construction Stage				
Storage and handling of fuels / chemicals	1	SW Runoff GW Flowpaths	Surface water and groundwater Contamination due to Oils, Fuels & Chemicals	Rationale for Excluding: impacts (if any) Neutral The route of the UWF Grid Connection through the NHA does not intersect blanket bog as it uses an existing forestry track on the verge of the bog. Therefore, there will be no excavation of peat or crossing overland on peat. Also, there will be no refuelling of vehicles or plant permitted within the NHA (Project Design Measure). Any small leaks would be limited to a short section of mineral subsoils underneath the existing access track. The access road exists downslope (down-gradient) of the bog, and therefore there can be no surface water or groundwater flow from the works area towards the bog. The overall effects (if any) on the NHA will be Neutral.
Use of Cement Based Compounds	1	SW Runoff GW Flowpaths	Surface water and groundwater Contamination due to Cement Based Compounds	Rationale for Excluding: Neutral Impacts The route of the UWF Grid Connection through the NHA does not intersect blanket bog as it uses an existing forestry track on the verge of the bog. Therefore, there will be no excavation of peat or placement of cement within peat. There will be no contamination of blanket bog by cement as the works is downslope of the bog and within mineral subsoil. Contact with the cement will be limited to a short section of mineral subsoils underneath the existing access track. The access road exists downslope (down-gradient) of the bog, and therefore there can be no indirect effects as a result of contaminated surface water runoff or groundwater flow towards the bog) Only a temporary (and reversible) increase in the pH of the subsoil in direct contact with the cement is likely to occur. The cement will also not come in contact with groundwater as no groundwater table was found during the excavation of the 2 no. trial pits within the NHA. The effects, which will be localised to the cable trench will only persist until after the cement mix has hardened and the residual high alkalinity leachate flushed out / diluted by rainfall. The trench will be backfilled with natural material, and therefore there will be no exposed cement material. The overall effects on the NHA will be Neutral.

Note: As the UWF Grid Connection will not cause effects greater than Neutral to Bleanbeg Bog NHA, there is no potential for significant cumulative effects with Turf Cutting activities.

11.7.5 Mitigation Measures for Impacts to Bleanbeg Bog NHA

Mitigation measures are not relevant as there is **no potential for UWF Replacement Forestry to cause impacts** to Bleanbeg Bog NHA.

11.7.6 Evaluation of Residual Impacts to Bleanbeg Bog NHA

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 Replacement Forestry (Section 11.7.1), i.e. **no potential for impacts**.

11.7.1 Application of Best Practice and the EMP for Bleanbeg Bog NHA

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Bleanbeg Bog NHA.

11.7.2 Summary of Impacts to Bleanbeg Bog NHA

No impacts to the Bleanbeg Bog NHA are concluded by the topic authors as likely to occur as a consequence of the development of UWF Replacement Forestry.

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 11-53: Summary of the impacts to Bleanbeg Bog NHA

Impact to Bleanbeg Bog NHA	-
<i>Evaluation Section (relates to Other Elements only)</i>	<i>Section 11.7.4.1</i>
Project Life-Cycle Stage <i>(relates to Other Elements only)</i>	All (UWF Grid Connection)
<u>UWF Replacement Forestry</u>	No Potential for Impacts Evaluated as Excluded - See Section 11.7.1
Element 1: UWF Grid Connection	Neutral impacts / No potential for impacts
Element 2: UWF Related Works	No Potential for Impacts Evaluated as Excluded (see Section 11.7.2.2.)
Element 4: Upperchurch Windfarm	No Potential for Impacts Evaluated as Excluded (see Section 11.7.2.2.)
Element 5: UWF Other Activities	No Potential for Impacts Evaluated as Excluded (see Section 11.7.2.2.)
<u>Cumulative Impact:</u> <i>(relates to Other Elements only)</i>	
All Other Elements of the Whole UWF Project	No Potential for Cumulative Impacts
<u>Cumulative Impact:</u> All Other Elements of the Whole UWF Project <i>cumulatively with</i> Other Projects or Activities	No Potential for Cumulative Impacts (due to Neutral or No impacts from the UWF Grid Connection)

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

Bleanbeg Bog NHA

Sensitive Aspect

Water

Topic

11.8 Sensitive Aspect No.7: 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.

11.8.1 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

11.8.1.1 Baseline Characteristics of Local Water Dependent Habitats

No suitable Marsh Fritillary habitat was recorded on or adjacent (50m) to the UWF Replacement Forestry lands during Biodiversity surveys (refer to Chapter 8, Section 8.11).

11.8.1.2 Evaluation of UWF Replacement Forestry

The UWF Replacement Forestry was evaluated for its potential to cause impacts to Local Water Dependent Habitats. It was evaluated by the topic authors that the UWF Replacement Forestry is **no potential for impact** **Local Water Dependent Habitats**, for the following reasons:

- The absence of suitable marsh fritillary habitat (local water dependent habitat) on or adjacent to the afforestation lands.

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

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

UWF Replacement Forestry is not likely to cause impacts to Local Water Dependent Habitats by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 11.8.2 to Section 11.8.4 and included in the summary table in Section 11.8.8 in order to show the totality of the project.

11.8.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.8.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Local Water Dependent Habitat 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 11.8.2.2.1](#) below.

The evaluation of cumulative impacts to Local Water Dependent Habitat 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 Habitat with either the UWF Replacement Forestry 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 \(Section A2.3 .1 and Section A2.3.11\)](#).

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 Replacement Forestry 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.

11.8.2.2 Cumulative Evaluation Study Area

The study area for the cumulative evaluation is described in Table 11-54.

Table 11-54: 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/ 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 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

11.8.2.2.1 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 11-55.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on **Figure CE 11.8: Local Water Dependent Habitats within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 11-55: Result 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 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No 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.

11.8.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.8.2.3.1 Element 1: UWF Grid Connection

In the UWF Grid Connection Study Area, Marsh Fritillary butterfly has been mapped in wet grassland, close to route Section S55 of the 110kV UGC and in wet heath at Section S66 of the 110kV UGC.

The habitats at the locations identified above are relatively small and fragmented.

Small sections of the 110kV UGC are routed through an area of wet grassland and an area of wet heath which are both located on sloping ground, with areas of the habitat existing both upslope and downslope of the route of the 110kV UGC. Therefore, the flowpath of the natural drainage within both the wet grassland and wet heath areas runs across the location of the 110kV UGC in these areas.

11.8.2.3.2 Element 2: UWF Related Works

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.

11.8.2.3.3 Element 4: Upperchurch Windfarm

The habitat described for UWF Related Works above is also relevant for the Upperchurch Windfarm.

11.8.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 11.8.2.2.1.

Local Water Dependent Habitats	<p>11.8.2.3.5 Other Projects or Activities:</p> <p>Not applicable – <u>No</u> Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.8.2.1.</p>
	<p>11.8.2.4 Cumulative Information Baseline Characteristics - Importance of Local Water Dependent Habitats</p> <p>The wet grassland and wet heath habitat supports populations of Marsh Fritillary (Annex II) and therefore has high importance</p>
Sensitive Aspect	<p>11.8.2.5 Cumulative Information Baseline Characteristics - Sensitivity of Local Water Dependent Habitats</p> <p>Wet grassland and wet heath habitats are sensitive to certain land use practices and specifically where drainage is being carried out.</p>
	<p>11.8.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)</p> <p>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 for further information). 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).</p>
	<p>11.8.2.7 Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)</p> <p>It is assumed that the habitats identified will be the receiving environment during the time of the development works.</p>

11.8.3 Cumulative Information: PROJECT DESIGN MEASURES for Local Water Dependent Habitats

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 Related Works and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in [Appendices 5.3, 5.4 and 5.5](#) in [Volume C4: EIAR Appendices](#).

Local Water Dependent Habitats

Sensitive Aspect

Water

Topic

11.8.4 Cumulative Information: EVALUATION OF IMPACTS to Local Water Dependent Habitats

It was evaluated, in Section 11.8.1, that **UWF Replacement Forestry has no potential to cause impacts to Local Water Dependent Habitats.**

This Section evaluates the likely cumulative 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) - Local Water Dependent Habitats.

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

Table 11-56: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	<u>Impacts Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
Drainage of water dependent habitat (construction/operational stage)	<u>No other impacts were excluded</u> 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 11.8.4.1.**

Note: No other impacts were excluded from the evaluation.

11.8.4.1 Impact Evaluation Table: Drainage of Marsh Fritillary habitat

Evaluation of UWF Replacement Forestry Excluded: Due to the absence of suitable Marsh Fritillary habitat in the afforestation lands, there is no potential for UWF Replacement Forestry to effect Local Water Dependant Habitat by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because UWF Replacement Forestry 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)	Construction / Operational Stage
<p><u>Cumulative Impact Source:</u> Excavations and permanent infrastructure</p> <p><u>Impact Pathway:</u> Surface water and groundwater flowpaths</p> <p><u>Impact Description:</u> Alteration of wet habitat drainage/hydrology within the works area as a result of temporary excavation works and permanent infrastructure and drainage.</p> <p><u>Impact Quality:</u> Negative</p>	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
<p><u>Impact Magnitude:</u> The 110kV UGC intercepts Wet Grassland at route Section S55 (for 140m) and in Wet Heath as Section S66 (for 160m). Areas of the wet habitat exist both upslope and downslope of the works area.</p> <p>Due to the shallow and temporary nature of the excavations in the vicinity of the habitat, the long term impact magnitude will be Negligible.</p>	
<u>Significance of the Impact:</u> Imperceptible	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 11-7, Negligible magnitude combined with the High Importance of the habitat; • The works at route Sections S55 and S66 will only comprises a temporary trench and temporary access road, and therefore any minor effects will be temporary; • The shallow and temporary nature of the cable trench which will be backfilled; • The natural ground surface will be reinstated after the works are complete and therefore the natural drainage regime (surface water runoff and groundwater) will be restored (Project Design Measure); and, • All effects will be brief to temporary and reversible. 	
Element 2: UWF Related Works	
<p><u>Impact Magnitude:</u> 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.</p>	
<u>Significance of the Impact:</u> Imperceptible	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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; 	

Local Water Dependent Habitats	<ul style="list-style-type: none"> • 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 4: Upperchurch Windfarm
	<u>Impact Magnitude:</u> 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.
	<u>Significance of the Impact:</u> Not Significant
Sensitive Aspect	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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 – <i>N/A, evaluated as excluded, see Section 11.8.2.2.1</i>
Evaluation of Cumulative Impacts – Drainage of Marsh Fritillary habitat	
All Elements of the Whole UWF Project	
<u>Cumulative Impact Magnitude:</u> Cumulative impacts of the UWF Grid Connection and the UWF Related Works/Upperchurch Windfarm will remain at Negligible as the habitat along the UWF Grid Connection (110kV UGC) is remote from the UWF Related Works and Upperchurch Windfarm, and therefore no in-combination effects can occur with the UWF Grid Connection. 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 Windfarm 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	
<u>Rationale for Cumulative Impact Evaluation:</u> <ul style="list-style-type: none"> • 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; and, • The consented windfarm drainage design will maintain the existing drainage regime. 	

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.8.2.1).

11.8.5 Mitigation Measures for Impacts to Local Water Dependent Habitats

Mitigation measures are not relevant as there is **no potential for UWF Replacement Forestry to cause impacts** to Local Water Dependent Habitat.

11.8.6 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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Replacement Forestry (Section 11.8.1), i.e. **no potential for impacts**.

11.8.7 Application of Best Practice and the EMP for Local Water Dependent Habitats

No Best Practice Measures have been developed specifically for Local Water Dependent Habitats as there is no Marsh Fritillary habitat (local water dependent habitat) to manage or protect at the UWF Replacement Forestry site.

11.8.8 Summary of Impacts to Local Water Dependent Habitats

No impacts to Local Water Dependent Habitats are concluded by the topic authors as likely to occur as a consequence of the development of UWF Replacement Forestry.

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 11-57: Summary of the impacts to Local Water Dependent Habitats

Impact to Local Water Dependent Habitats:	Drainage of Marsh Fritillary habitat
<i>Evaluation Impact Table (relates to Other Elements only)</i>	<i>Section 11.8.4.1</i>
Project Life-Cycle Stage <i>(relates to Other Elements only)</i>	Construction/ Operation
<u>UWF Replacement Forestry</u>	No Potential for Impacts Evaluated as Excluded - see Section 11.8.1
Element 1: UWF Grid Connection	Imperceptible
Element 2: UWF Related Works	Imperceptible
Element 4: Upperchurch Windfarm	Not Significant
Element 5: UWF Other Activities	No Potential for Impacts Evaluated as Excluded, see Section 11.8.2.2.1
<u>Cumulative Impact:</u> <i>(relates to Other Elements only)</i>	
All Elements of the Whole UWF Project	Slight

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Local Water Dependent Habitats with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 11.8.2.1).

11.9 Policy Context

11.9.1 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.

11.9.2 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).

11.9.3 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:

<u>No.</u>	<u>Policy</u>
LH6	<p>Natura 2000 Sites and Protected Species</p> <p>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.</p>
LH7	<p>Natural Heritage Areas</p> <p>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.</p>
LH8	<p>Inland Waters and Riparian Zones</p> <p>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.</p>
LH12	<p>Water Framework Directive and River Basin Management Plans</p> <p>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).</p>

11.10 Best Practice Measures

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Water.

11.11 Summary of the Water Chapter

The development of UWF Replacement Forestry will involve the planning of 6ha of lands with deciduous woodland. This woodland will be permanent woodland and will not be harvested commercially. A stream flows through the western part of the lands, which forms part of the local Clodiagh River surface water body catchment, which is within the regional River Suir catchment. The Lower River Suir SAC is located over 12km downstream of the UWF Replacement Forestry lands.

The sensitive aspects of Water evaluated in this topic chapter include: Local Surface Water Bodies and the Lower River Suir SAC.

Other sensitive aspects of Water which are included in this chapter in order to show the totality of the whole project are Local Groundwater Bodies, Local Wells & Springs, Lower River Shannon SAC, Bleanbeg Bog NHA and Local Water Dependent Habitats – UWF Replacement Forestry will not effect these sensitive aspects.

Environmental protection measures have been integrated into the design of the UWF Forestry to avoid or reduce water quality effects, and include; planting the new native woodland by hand; no use of herbicides or pesticides, no storage of fuels on the lands, implementing a water set-back area from the watercourse and using the existing crossings points over the watercourse to access the lands with no upgrades or any other instream works required at these crossing points.

11.11.1 Summary of UWF Replacement Forestry Impacts

The likely adverse impacts to the individual Sensitive Aspects are outlined below:

- Impacts to Local Surface Water Bodies (specifically the Clodiagh River) and to the Lower River Suir SAC as a consequence of the UWF Replacement Forestry, will be no greater than Imperceptible adverse.
- The UWF Replacement Forestry will not cause impacts to Local Groundwater Bodies, Local Wells & Springs, Lower River Shannon SAC, Bleanbeg Bog NHA or Local Water Dependent Habitats.

11.11.2 Summary of the Cumulative Impacts

As the UWF Replacement Forestry 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 Related Works, Upperchurch Windfarm and UWF Grid Connection).

- In-combination impacts to Local Surface Water Bodies of UWF Replacement Forestry with the Other Elements of the Whole UWF Project, ranged from Imperceptible to Slight-Moderate,
- In-combination impacts to Lower River Suir SAC of UWF Replacement Forestry with the Other Elements of the Whole UWF Project will remain Imperceptible,
- There is no potential for UWF Replacement Forestry to contribute to cumulative effects to Local Groundwater Bodies, Local Wells & Springs, Lower River Shannon SAC, Bleanbeg Bog NHA or Local Water Dependent Habitats. With the exception of Bleanbeg Bog NHA, the in-combination effects of the Other Elements will not be greater than Imperceptible. There is no potential for cumulative impacts to Bleanbeg Bog NHA, as UWF Grid Connection is the only Element which has the potential to cause effects to this sensitive aspect.

11.11.3 Summary of Impacts from Other Elements of the Whole UWF Project

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 and the Newport Distributor Road, which are both consented projects and could be constructed during the same period as these Whole UWF Project Elements.

- UWF Replacement Forestry will not contribute to cumulative effects with Other Projects or Activities.
- Cumulative impacts of the Other Elements of the Whole UWF Project to Local Surface Water Bodies only relates to UWF Grid Connection, which together with Bunkimalta Windfarm and Newport Distributor Road could cause Slight adverse impacts to Local Surface Water Bodies (in particular the Clare River and Newport (Mulkear) River catchments).
- Cumulative impacts of the Other Elements (UWF Grid Connection, UWF Related Works and Upperchurch Windfarm), with Bunkimalta Windfarm and Newport Distributor Road, to the Lower River Shannon SAC will be 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 UWF Replacement Forestry, either alone or in combination with Other Elements of the Whole UWF Project or Other Projects or Activities.

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UWF Replacement Forestry EIA Report

Volume C2: EIAR Main Report

Chapter 12: Air

Topic Chapter Authors:



EIAR Coordinator:



REFERENCE DOCUMENTS

	Air
Topic	

Contents

12	Environmental Factor: Air	1
12.1	Introduction to the Air Chapter	1
12.1.1	What is Air?	1
12.1.2	Overview of Air in the Local Environment.....	1
12.1.3	Sensitive Aspects of the Air Environment included for further evaluation.....	2
12.1.4	Sensitive Aspects excluded from further evaluation.....	2
12.1.5	Overview of the Subject Development	3
12.1.6	The Authors of the Air Chapter	3
12.1.7	Sources of Baseline Information	4
12.1.7.1	Certainty and Sufficiency of Information Provided	5
12.1.8	Methodology for Evaluating Effects to Air Quality.....	6
12.1.8.1	Air Quality Standards.....	6
12.1.8.2	Transport Infrastructure Ireland Guidance on Traffic based air pollutants	6
12.1.8.3	IAQM Guidance on Construction Dust Emissions	7
12.1.9	Methodology for Evaluating Noise & Vibration Effects	12
12.1.9.1	NRA Guidelines on Construction Noise	12
12.1.9.2	Methodology for Evaluating Operational Stage Noise.....	12
12.1.9.3	TII Guidelines for Evaluating Vibration Effects	14
12.1.10	Methodology for Evaluating Electromagnetic Fields Effects.....	15
12.1.10.1	Treatment of the Existing Electricity and Communication Networks	15
12.1.10.2	Treatment of Naturally Occurring Electric and Magnetic Fields	15
12.1.10.3	Authors Methodology for Modelling Theoretical Worst-Case Effects	15
12.1.10.4	ICNIRP General Public Reference levels	15
12.1.10.5	Authors Methodology for Evaluating the Magnitude and Significance of Impacts	16
12.2	Sensitive Aspect No.1: Local Residents & Community	19
12.2.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	19
12.2.1.1	Baseline Characteristics of Local Residents & Community in relation to UWF Replacement Forestry.....	19
12.2.1.2	UWF Replacement Forestry Project Design	19
12.2.1.3	Evaluation of UWF Replacement Forestry	19
12.2.1.4	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	19
12.2.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	21
12.2.2.1	Overview of Other Elements, Other Projects or Activities	21
12.2.2.2	Cumulative Evaluation Study Area	21
12.2.2.3	Cumulative Information: Baseline Characteristics – Context & Character	22

12.2.2.4	Cumulative Information Baseline Characteristics - Importance of Local Residents & Community	24
12.2.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Local Residents & Community	25
12.2.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)	25
12.2.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	25
12.2.3	Cumulative Information: PROJECT DESIGN MEASURES for Local Residents & Community	27
12.2.4	Cumulative Information: EVALUATION OF IMPACTS to Local Residents & Community	28
12.2.4.1	Impact Evaluation Table: Increase in Airborne Dust	29
12.2.4.2	Impact Evaluation Table: Increase in Ambient Noise Levels	32
12.2.4.3	Impact Evaluation Table: Increase in Ambient Noise Levels	35
12.2.4.4	Impact Evaluation Table: Increase in Ambient EMF Levels	37
12.2.4.5	Impact Evaluation Table: Interference with Electronic Equipment	40
12.2.4.6	Cumulative Information: Description and Rationale for Excluded (scoped out) Impacts	43
12.2.5	Mitigation Measures for Impacts to Local Residents & Community	45
12.2.6	Evaluation of Residual Impacts to Local Residents & Community	45
12.2.7	Application of Best Practice and the EMP for Local Residents & Community	45
12.2.8	Summary of Impacts to Local Residents & Community	46
12.3	Sensitive Aspect No.2: Transient People	47
12.3.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	47
12.3.1.1	Baseline Characteristics of Transient People in relation to UWF Replacement Forestry	47
12.3.1.2	UWF Replacement Forestry Project Design	47
12.3.1.3	Evaluation of UWF Replacement Forestry	47
12.3.1.4	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	48
12.3.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	49
12.3.2.1	Overview of Other Elements, Other Projects or Activities	49
12.3.2.2	Cumulative Evaluation Study Area	49
12.3.2.3	Cumulative Information: Baseline Characteristics – Context & Character	50
12.3.2.4	Cumulative Information Baseline Characteristics - Importance of Transient People	52
12.3.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Transient People	52
12.3.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)	53
12.3.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	53
12.3.3	Cumulative Information: PROJECT DESIGN MEASURES for Transient People	54
12.3.4	Cumulative Information: EVALUATION OF IMPACTS to Transient People	54

12.3.4.1	Impact Evaluation Table: Increase in Ambient EMF Levels	55
12.3.4.2	Impact Evaluation Table: Interference with Electronic Equipment	59
12.3.4.3	Cumulative Information: Description and Rationale for Excluded (scoped out) Impacts	64
12.3.5	Mitigation Measures for Impacts to Transient People.....	67
12.3.6	Evaluation of Residual Impacts to Transient People	67
12.3.7	Application of Best Practice and the EMP for Transient People	67
12.3.8	Summary of Impacts to Transient People	68
12.4	Policy Context	69
12.4.1	National Policy	69
12.4.2	Regional Policy.....	69
12.4.3	North Tipperary County Development Plan 2010 (as varied):	69
12.5	Best Practice Measures	70
12.6	Summary of the Air Chapter	71
12.6.1	Summary of UWF Replacement Forestry Impacts	71
12.6.2	Summary of Cumulative Impacts with Other Elements of the Whole UWF Project.....	71
12.6.3	Summary of Cumulative Impacts with Other Projects or Activities	71
12.7	Reference List	72

List of Figures

<u>Figure No.</u>	<u>Figure Title</u>
Figure RF 12.1	Location of the UWF Replacement Forestry
Figure CE 12.2.1	Local Residents & Community (Dust, Noise) within the Cumulative Evaluation Study Area
Figure CE 12.2.2	Local Residents & Community (EMF) within the Cumulative Evaluation Study Area
Figure CE 12.3	Transient People within the Cumulative Evaluation Study Area

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

List of Appendices

<u>Appendix No.</u>	<u>Appendix Title</u>
Appendix 12.1	Air Quality Monitoring & Standards
Appendix 12.2	Noise Modelling & Background Noise Measurement
Appendix 12.3	Explanation and Modelling of EMF

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

List of Abbreviations

<u>Abbreviation</u>	<u>Full Term</u>
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
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 Cables
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
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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 + NO₂) and particulate matter (PM₁₀ 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 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.

The location of the UWF Replacement Forestry is illustrated on OSI Mapping on **Figure RF 12.1: Location of the UWF Replacement Forestry.**

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 <i>(Telecommunication equipment on local masts and local signal paths between tele-communication masts)</i>	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 <i>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.</i>	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 Replacement Forestry is the subject development, being the subject of a current afforestation license application to the Minister for Agriculture, Food and the Marine.

Table 12-1: Subject Development –UWF Replacement Forestry

<u>Project ID</u>	<u>The Subject Development</u>	<u>Composition of the Subject Development</u>
Element 3	The Subject Development UWF Replacement Forestry (RF)	Replacement Forestry at Foilnahan

Note: The UWF Replacement Forestry is 'Element 3' 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 Replacement Forestry \(Volume C2 EIAR Main Report\)](#).

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	<p>Feedback was received from</p> <ul style="list-style-type: none"> Health Service Executive Members of the public during the Public Consultation and Information Day <p>See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.</p>
Industry Guidance	<ul style="list-style-type: none"> 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: Licence 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	<ul style="list-style-type: none"> 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 AC Field Modelling of the fields from the works Comreg, ESB and Radiological Protection Institute of Ireland online Information

Type	Source
	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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

<u>Pollutant</u>	<u>Regulation¹</u>	<u>Limit Type</u>	<u>Value</u>
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 links² 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

<u>TII Criteria</u>	<u>Criteria met?</u>
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 soiling³, or exposure to PM₁₀ 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

<u>Sensitivity of a Human Receptor to Dust soiling</u>	
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 <u>not</u> present continuously or regularly for extended periods of time
Low	locations where enjoyment of amenity is <u>not</u> reasonably expected
	property <u>not</u> 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
<u>Sensitivity of a Human Receptor to health impacts from PM₁₀</u>	
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 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
<u>Sensitivity of an ecological receptor to Dust Soiling</u>	
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 PM₁₀ 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 PM₁₀; 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)

<u>Receptor Sensitivity</u>	Number of Receptors	<u>Distance from the Source (m)</u>			
		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

<u>Receptor Sensitivity</u>	Annual Mean PM ₁₀ concentration	Number of Receptors	<u>Distance from the Source (m)</u>				
			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

<u>Receptor Sensitivity</u>	<u>Distance from the Source (m)</u>	
	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 m², 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 m² – 10,000 m², 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 m², 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 m³, on-site concrete batching, sandblasting;
- **Medium:** Total building volume 25,000 m³ – 100,000 m³, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- **Small:** Total building volume < 25,000 m³, 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

<u>Sensitivity of Area</u>	<u>Dust Emission Magnitude</u>		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk – earthworks/construction	Low Risk – earthworks/construction
		or Low Risk - trackout	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

<u>Period</u>	<u>Working Hours</u>	<u>LAeq(1 hour) dB⁴</u>	<u>LpA_{(Max)slow}⁵ dB</u>
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 study area 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.

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 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.

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.

Table 12-11: IEMA (2014) Guidelines for Evaluating the Magnitude of Noise Impact

<u>EPA Terminology</u>	<u>Description</u>	<u>Receptor Perception of Effects</u>
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

Introduction, Authors, Sources, Methodology

Table 12-12: IEMA (2014) Guidelines for Evaluating the Sensitivity of Receptor

<u>EPA Terminology</u>	<u>Description</u>
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

<u>Magnitude</u>	<u>Sensitivity of Receptor</u>			
	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

Air
Topic

12.1.9.2.2 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.

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)*

12.1.9.3 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

<u>Exposure Characteristics</u> <u>ICNIRP</u>	<u>Electric Field Strength</u> <u>V/m</u>	<u>Magnetic Field Strength</u> <u>μT</u>
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

<u>Magnitude</u>		<u>Significance of Effects</u>		
<u>Magnitude Rating</u>	<u>Field Strength</u>	<u>Local Residents & Community</u>	<u>Transient People</u>	<u>Electronic Equipment</u>
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

<u>Magnitude</u>		<u>Significance of Effects</u>		
<u>Magnitude Rating</u>	<u>Field Strength</u>	<u>Local Residents & Community</u>	<u>Transient People</u>	<u>Electronic Equipment</u>
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	Significant to Profound EU EMF and HSA levels breached but not applicable to transient people	Profound Significantly above All Electrical Device test levels
		Profound > 6000 μT HSA High Action Level reached	Above Test Levels for AIMD Devices	

Introduction, Authors, Sources, Methodology

Topic	Air
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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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

12.2.1.1 Baseline Characteristics of Local Residents & Community in relation to UWF Replacement Forestry

The UWF Replacement Forestry is located in a sparsely populated area, which can be characterised as having good air quality, and is a quite rural location with no major existing noise sources. There are no community facilities in immediate area of the UWF Replacement Forestry lands.

12.2.1.2 UWF Replacement Forestry Project Design

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the UWF Replacement Forestry – 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 12-17 are relevant to **Local Residents & Community**.

Table 12-17: UWF Replacement Forestry Project Design Measures relevant to Local Residents & Community

PD ID	Project Design Environmental Protection Measure (PD)
RF-PD-02	The lands will be planted by hand, using spades and hand tools.

12.2.1.3 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Local Residents & Community.

It was evaluated by the topic authors that **impacts to Local Residents & Community will be Neutral or None** due to the development of the UWF Replacement Forestry, for the following reasons:

- 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.

12.2.1.4 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry will cause Neutral or No impacts to Local Residents & Community by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 12.2.2 to Section 12.2.4** and included in the summary table in **Section 12.2.8** in order to show the totality of the project.

12.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

12.2.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Local Residents & Community 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 12.2.2.2.1** below.

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 Replacement Forestry 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 A2.3.12)**.

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Local Residents & Community with UWF Replacement Forestry 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.

12.2.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 12-18.

Table 12-18: 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 Operational EMF: 200m from Mountphilips Substation, 110kV UGC, Internal Windfarm Cabling, Consented UWF Turbines and Consented UWF Substation.	Air Quality: 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, Construction Noise: Based on Guidelines for the Treatment of Noise and Vibration in National Road Schemes (increased to align with the Air Quality study area), Operational Noise: Beyond this distance, there is no potential for any increases in ambient noise levels. Operational EMF: Based on professional judgement, EMF Field emissions can extend to this distance. At distances <u>greater than</u> 100m from the Mountphilips Substation, 110kV UGC, Internal Windfarm Cabling, Consented UWF Substation and Consented UWF Turbines, the contribution to ambient EMF levels will be extremely low or none, with effects being considered neutral or none.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Project or Activity: Shannonbridge – Killonan 220kV OHL (existing) <u>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 Replacement Forestry.</u>		

Local Residents & Community	12.2.2.2.1 Potential for Impacts to Local Residents & Community														
	<p>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 12-19.</p> <p>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 12.2.1: Local Residents & Community (Dust, Noise) within the Cumulative Evaluation Study Area and Figure CE 12.2.2: Local Residents & Community (EMF) within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).</p>														
Sensitive Aspect	Table 12-19: Results of the Evaluation of the Other Elements and Other Projects or Activities														
	<table><tr><th colspan="2">Other Elements of the Whole UWF Project</th></tr><tr><td>Element 1: UWF Grid Connection</td><td>Included for the evaluation of cumulative effects</td></tr><tr><td>Element 2: UWF Related Works</td><td>Included for the evaluation of cumulative effects</td></tr><tr><td>Element 4: Upperchurch Windfarm (UWF)</td><td>Included for the evaluation of cumulative effects</td></tr><tr><td>Element 5: UWF Other Activities</td><td>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.</td></tr><tr><th colspan="2">Other Projects or Activities</th></tr><tr><td>Shannonbridge – Killonan 220kV OHL (existing)</td><td>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 Replacement Forestry.</td></tr></table>		Other Elements of the Whole UWF Project		Element 1: UWF Grid Connection	Included for the evaluation of cumulative effects	Element 2: UWF Related Works	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 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)
Other Elements of the Whole UWF Project															
Element 1: UWF Grid Connection	Included for the evaluation of cumulative effects														
Element 2: UWF Related Works	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 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 Replacement Forestry.														
Air															
	12.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character														
Topic	12.2.2.3.1 Element 1: UWF Grid Connection, Element 2: UWF Related Works & Element 4: Upperchurch Windfarm														

The number of local residences and community facilities within the Cumulative Evaluation Study Area are outlined on Table 12-20 and included on [Figures CE 12.2 \(Figure CE 12.2.1 and Figure CE 12.2.2\)](#).

12-20: Number of Local Residences and Community within the Cumulative Evaluation Study Area

Individual Project Element	<u>Local Residents & Community within 350m of Construction Works Areas (Air Quality, Noise, Vibration)</u>	<u>Local Residents & Community within 50m of Materials Haulage Routes (Air Quality only)</u>	<u>Local Residents & Community within 100m Of Electrical Parts (EMF only)</u>
UWF Grid Connection	127 No. residences 6 No. community facilities (pubs, a shop, church, community centre and a school)	248 No. residences between the R503 and the site entrances on the following local roads: L-2166-0, L-2156-11, L-2157-5, L-6011-10, L-95032-8, L-21141-0, L-2114-0, L6085-0, L-6086-5, L-2266-0, R-497-0 and L-2264-50. Community facilities in Rear Cross and Kilcommon villages and in Newport town.	None within 100m of the Mountphilips Substation. 37 No. local residences and 1 No. community facility (shop) within 100m of the 110kV UGC.
UWF Related Works	36 No. residences (5 no. within 50m) No community facilities	35 No. residences along local roads between the consented Upperchurch Windfarm Site Entrance No.1 and the various consented Upperchurch Windfarm site entrances (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
Upperchurch Windfarm	30 No. local residences within 350m, 3 No. within 50 of site entrances, none within 200m of a Consented UWF Turbine. No community facilities	33 No. residences along local roads between the Upperchurch Windfarm Site Entrance No.1 and the various Upperchurch Windfarm site entrances (L-4139-0, L-2264-50, L-6188-0, L-4138-12 and L-6185-13). No community facilities	None: No local residences or community facilities within 100m of the Consented UWF Turbines or Consented UWF Substation.

Air Quality: All residential properties and community facilities, within the Cumulative Evaluation 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 (NO₂, PM₁₀ 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: 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. Baseline noise monitoring undertaken as part of the characterisation of the Mountphilips Substation confirms the characterisation of the area surrounding the substation as being an area of low background noise (See [Appendix 12.2: Noise Modelling & Background Noise Measurement](#)). Existing noise levels around the route of the 110kV UGC are low and the 110kV UGC is considered to be located within an area with low background noise, similar to the Mountphilips Substation location. 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 12.1.6.4.3) in relation to the general public for exposure to frequency EMF associated with electrical power systems, is 5000V/m for electric fields exposure and 100 μT for magnetic field exposure.

EMF – Electronic Equipment: Two types of electronic equipment are evaluated in this report; 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 electrical and communication equipment associated with the Elements of the Whole UWF Project.

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**.

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 Replacement Forestry.

12.2.2.4 Cumulative Information Baseline Characteristics - Importance of 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 centered 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 recognized 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/EC8). 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

⁸ https://ec.europa.eu/health/sites/health/files/electromagnetic_fields/docs/emf_rec519_en.pdf

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 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.

12.2.2.5 Cumulative Information Baseline Characteristics - 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 (6 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 $24 \mu\text{g}/\text{m}^3$, 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 breach 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

12.2.2.6 Cumulative Information Baseline Characteristics - 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 $\text{PM}_{2.5}$ are likely to remain at existing levels. In Ireland the primary sources of Particulate Matter (PM_{10} and $\text{PM}_{2.5}$) are vehicular emissions and burning of solid fuels for heating. Due to the nature of the area (remotely populated with few congested roads) PM emissions are unlikely to change dramatically in future years. Small fluctuations are likely in line with previous trends.

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.

12.2.2.7 Cumulative Information Baseline Characteristics - 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 & vibration: The Milestone wind farm is currently under construction, construction works will be completed in Summer 2018. The Milestone Grid Connection which travels south through Hollyford along the regional road, is scheduled to be completed by July 2018. Therefore there will be no overlap of construction

periods. The Milestone windfarm is expected to be operational in August 2018, therefore the baseline noise environment in the vicinity of Milestone wind farm will have altered by August 2018.

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.

12.2.3 Cumulative Information: PROJECT DESIGN MEASURES for Local Residents & Community

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 Related Works, and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in [Appendices 5.3, 5.4 and 5.5](#) in [Volume C4: EIA Appendices](#).

Local Residents & Community

Sensitive Aspect

Air

Topic

12.2.4 Cumulative Information: EVALUATION OF IMPACTS to Local Residents & Community

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Local Residents & Community**, see Section 12.2.1.

This Section presents the likely cumulative effects of the Other Elements of the Whole UWF Project. The cumulative effects of the Other Elements with Other Projects or Activities is also presented.

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 12-21: List of all Impacts included and excluded from the Impact Evaluation Table sections

<u>Impacts Included</u> (Evaluated in the Impact Evaluation Table sections)	<u>Impacts Excluded</u> (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
Interference with Electronic Equipment (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 12.2.4.5**

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 12.2.4.6

12.2.4.1 Impact Evaluation Table: Increase in Airborne Dust

Evaluation of UWF Replacement Forestry Excluded: As the new woodland will be planted by hand, using spades, the UWF Replacement Forestry will cause neutral airborne dust effects to Local Residents & Community by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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)

Construction stage

Impact Source: n/a

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

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 25,190m³ of potentially dusty materials (rocks, soils etc.), the storage and handling of 14,050m³ of this material on site, and the delivery of 455 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 127 No. local residences and 6 No. of community facilities within 350m of the UWF Grid Connection construction works areas. In addition, there are 248 No. local residences within 50m of haulage routes along local roads between the Regional Road R503 and the various site entrances.

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 (109 of 127 No.) from the works areas and haul routes;
- background levels of particulate matter are substantially below the relevant EU limit values.

Local Residents & Community	Sensitive Aspect	Element 2: UWF Related Works
		<p><u>Impact Magnitude:</u> The emission of dust from excavation and backfilling of 11,830m³ of potentially dusty materials (rocks, soils etc.), the storage and handling of 930m³ 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. In addition, there are 23 No. local residences within 50m of haulage routes along local roads between the Upperchurch Windfarm site entrance No.1 and other various site entrances along local roads.</p>
		Significance of the Impact: Slight
		<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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; • 28 of 45 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 4: Consented Upperchurch Windfarm
		<p><u>Impact Magnitude:</u> 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.</p>
		Significance of the Impact: No significant Impact
		<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 Cumulative Impacts – Increase in Airborne Dust
		All Elements of the Whole UWF Project
		<p><u>Cumulative Impact Magnitude:</u> The potential for cumulative in-combination effects with other elements of the Whole UWF Project is limited to:</p> <ul style="list-style-type: none"> - local residences located along the L2264-50, L6188-0 and L61881-0 local roads in the Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, which construction works associated with the UWF Grid Connection and the UWF Related Works are located within 350m of 23 No. of local residences. - Works associated with the UWF Related Works and the Upperchurch Windfarm are located within 350m of 25 No. of local residences. - Works associated with the UWF Grid Connection, UWF Related Works and the Upperchurch Windfarm are located within 350m of 21 No. of local residences. <p>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.</p>
Air	Topic	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

Local Residents & Community

Sensitive Aspect

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).

Air

Topic

12.2.4.2 Impact Evaluation Table: Increase in Ambient Noise Levels

Evaluation of UWF Replacement Forestry Excluded: As the new woodland will be planted by hand, using spades, there will be no sources of mechanical noise or vibration, and consequently there will be no potential for UWF Replacement Forestry 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 Replacement Forestry 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) Construction stage

Impact Source: n/a

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). 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 construction limit beyond 60m.

Impact Quality: Negative

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 7 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 28km 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 127 No. local residences and 6 No. community facilities (all in Kilcommon) within 350m of the remaining UWF Grid Connection construction works areas. These receptors are generally located along the public road network close to the public road sections or crossing points the 110kV UGC. 22 No. of the 127 No. residences are within 60m 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 (133 No.) within 350m of the works in the context of a 27.5km long grid connection, 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 22 No. residences within 60m.
- The temporary duration of exceedance of the guidelines limits (generally less than 1 week)
- The compliance with the guideline limits at all properties which are located farther 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).

Element 2: UWF Related Works

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. 5 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 5 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
- The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13).

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

Local Residents & Community	<p><u>Rationale for Impact Evaluation:</u></p> <p>As per the 2013 Inspectors Report:</p> <ul style="list-style-type: none"> • 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
	<p>Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 12.2.2.2.1</p>
	<p>Evaluation of Cumulative Impacts – Increase in Ambient Noise Levels</p>
	<p>All Elements of the Whole UWF Project</p>
Sensitive Aspect	<p><u>Cumulative Impact Magnitude:</u></p> <p>The potential for cumulative in-combination effects with other elements of the Whole UWF Project is limited to the 25 No. local residences located along the L2264-50, L6188-0 and L61881-0 in the Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, which are within 350m of construction works associated with, at least two of the following Elements: the UWF Grid Connection; the UWF Related Works; and the Upperchurch Windfarm. To protect Residential Amenity of residents along this road, 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 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.</p>
	<p>Significance of the Cumulative Impact: Moderate</p>
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • the NRA threshold limits are likely to be exceeded, at some locations • The low number (25 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)

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).

12.2.4.3 Impact Evaluation Table: Increase in Ambient Noise Levels

Evaluation of UWF Replacement Forestry 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 Replacement Forestry 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 Replacement Forestry 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 2: UWF Related Works

Impact Magnitude: None,

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- no sources of operational stage noise from any parts of the UWF Related Works.

Local Residents & Community	Element 4: Consented Upperchurch Windfarm
	<p><u>Impact Magnitude:</u> 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’.</p> <p>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.</p>
Sensitive Aspect	<u>Significance of the Impact: Moderate (turbines), No impact (substation)</u>
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 Cumulative Impacts – Increase in Ambient Noise Levels
	All Elements of the Whole UWF Project
	<u>Cumulative Impact Magnitude:</u> None.
	<u>Significance of the Cumulative Impact: No Potential for Cumulative Impact</u>
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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).

12.2.4.4 Impact Evaluation Table: Increase in Ambient EMF Levels

Evaluation of UWF Replacement Forestry Excluded: As there will be no sources of EMF, there will be no potential for UWF Replacement Forestry to cause increases in ambient EMF levels by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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: Mountphilips Substation, 110kV UGC, Internal Windfarm Cabling (UWF Related Works), 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 of the Whole UWF Project – i.e. the Mountphilips Substation, 110kV UGC, Internal Windfarm Cables, Consented UWF Turbines and Consented UWF Substation. Details of the modelling of worst case EMF emissions are included in Appendix 12.3 Explanation and Modelling of EMF .	
Impact Quality: Negative	

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 37 No. local residences and 1 No. community facility (shop) which are within 100m of the 110kV UGC. The worst case increase in levels of magnetic fields at local residences and community facilities within 100m ranged from 0.01 μ T to 1.79 μ T.

There will be no increase in magnetic fields at the local school in Kilcommon village.

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 earth (backfill) materials above the cables

Significance of the Impact: **Imperceptible** (110kV UGC) and **No Impact** (Mountphilips Substation)

Rationale for Impact Evaluation:

In relation to the 110kV UGC:

- the Low to Very Low magnitude of the new magnetic fields level in local residences or community facilities
- the new levels will be similar to existing ambient levels

Element 2: UWF Related Works

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. The worst case increased levels of magnetic fields at local residences within 100m ranged from 0.001 μ T to 0.069 μ T.

Local Residents & Community	Sensitive Aspect	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
		<u>Significance of the Impact:</u> Imperceptible
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none">the Very Low magnitude of the increased magnetic fields level in local residences– the new level of magnetic fields will remain under 1.26µTthe new levels will be similar to existing ambient levels
		Element 4: Consented Upperchurch Windfarm
		<u>Impact Magnitude:</u> None
Air	Topic	Significance of the Impact: No impact
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none">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
		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 Replacement Forestry.)
		Other Project: Shannonbridge – Killonan 220 kV Overhead Line (existing)
Air	Topic	<u>Impact Magnitude:</u> There is 1 No. residence which is within 100m of both the 110kV UGC (95m distance) and the existing 220kV OHL (53m distance). The 220kV OHL is currently increasing electric and magnetic field levels, under the worst case scenario, by 300 V/m and 0.98µT.
		<u>Significance of the Impact:</u> Imperceptible
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none">the Low magnitude of the electric fields level in accordance with Table 12-15the Very Low magnitude of the magnetic fields level in accordance with Table 12-16
		Evaluation of Cumulative Impacts – Increase in ambient EMF levels
		All Elements of the Whole UWF Project
Air	Topic	<u>Cumulative Impact Magnitude:</u> There are 5 No. local residences which are within 100m of both the 110kV UGC and the Internal Windfarm Cabling in the Knockmaroe and Knockcurraghboola Commons area. At these residences the cumulative, worst case increase in magnetic fields will be 0.182µT, which will increase ambient magnetic fields at the closest local residences to 0.382µT .
		No in combination effects will occur at any other residence or community facility and the impact of the 110kV UGC or Internal Windfarm Cabling will be as described above.
		Significance of the Cumulative Impact: Imperceptible
		<u>Rationale for Cumulative Impact Evaluation:</u> <ul style="list-style-type: none">the Very Low magnitude of the new magnetic fields level in local residences– the new level of magnetic fields will remain under 1.26µTthe new levels will be similar to existing ambient levels

All Elements of the Whole UWF Project with Other Projects or Activities	
<p><u>Cumulative Impact Magnitude:</u> Cumulative impacts with Other Projects relates to the combined impact of the 110kV UGC and the existing 220kV OHL. 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 in Mountphilips which is within 100m of both the existing 220kV and the 110kV UGC 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.</p>	
Significance of the Cumulative Impact: Imperceptible	
<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> 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 	

Local Residents & Community

Sensitive Aspect

Air

Topic

12.2.4.5 Impact Evaluation Table: Interference with Electronic Equipment

Evaluation of UWF Replacement Forestry Excluded: As there will be no sources of EMF, there will be no potential for UWF Replacement Forestry to cause interference to electronic equipment by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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: 110kV UGC (UWF Grid Connection), Internal Windfarm Cabling (UWF Related Works), 220kV Overhead line	
Impact Pathway: Air/Ground	
Impact Description: There will be some increase in ambient electromagnetic field levels in local residences which are within 100m of electric plant, such as voltage cables or lines.	
Impact Quality: Negative	

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

Element 1: UWF Grid Connection

Impact Magnitude:

No increase in electric fields from the 110kV UGC 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.

Any residential/business equipment or AIMD worn by local residents or members of the community within 100m of the 110kV UGC will be exposed to increased magnetic field levels. The **worst case increase in levels of magnetic fields** at local residences and community facilities within 100m (and where electrical equipment is likely to be used), ranged from **0.01µT to 1.79µT**.

Magnitude Result: Very Low, Low – depending on location

Significance of the Impact: Imperceptible to Slight

Rationale for Impact Evaluation:

- The Very Low to Low magnitude of increased magnetic fields at local residences or community facilities,
- Household Equipment typically is exposed to similar or higher levels. See Appendix 12.3 Table 4

Element 2: UWF Related Works

Impact Magnitude:

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

Any residential/business equipment or or AIMD worn by people within 100m of the Internal Windfarm Cabling will be exposed to increased magnetic field levels. The **worst case increase in levels of magnetic fields** at local residences and community facilities within 100m (and where electrical equipment is likely to be used), ranged from **0.001µT to 0.0699µT**.

Magnitude Result: Very Low

Local Residents & Community	Significance of the Impact: Imperceptible
	Rationale for Impact Evaluation: <ul style="list-style-type: none">The Very Low magnitude of increased magnetic fields at local residences
	Element 4: Consented Upperchurch Windfarm
	Impact Magnitude: None
	Significance of the Impact: No Impact
	Rationale for Impact Evaluation: <ul style="list-style-type: none">No local residences or community facilities within 100m of the Consented UWF Substation or Consented UWF Turbines.
	Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 12.2.2.2.1
	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 Replacement Forestry.)
	Other Project: Shannonbridge – Killonan 220 kV OHL
Sensitive Aspect	Impact Magnitude: Any equipment or AIMD worn by people in the 1 No. local residence which is within 100m of the 220kV OHL (53m distant) The worst case existing levels associated with the 220kV OHL. are 300 V/m and 0.98μT above the typical level in a residence.
	Significance of the Impact: Imperceptible
	Rationale for Impact Evaluation: <ul style="list-style-type: none">The Low magnitude of existing magnetic fields and Very Low magnitude of electric fields,
	Impact Magnitude: There is 1 No. residence which is within 100m of both the 110kV UGC (95m distance) and the existing 220kV OHL (53m distance). 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: <ul style="list-style-type: none">the Low magnitude of the electric fields level in accordance with Table 12-15the Very Low magnitude of the magnetic fields level in accordance with Table 12-16
	Evaluation of Cumulative Impacts – Interference with Electronic Equipment
	All Elements of the Whole UWF Project
	Cumulative Impact Magnitude: As per Section 12.2.7.5, the worst case combined increase in magnetic fields relates to 5 No. residents in the Knockmaroe/Knockcurraghola Commons area where the worst case maximum increase in ambient magnetic fields will be 0.182μT. No in combination effects will occur at any other residence or community facility and the impact of the 110kV UGC or Internal Windfarm Cabling will be as described above.)...
	Magnitude Result: Very Low
Air	Significance of the Cumulative Impact: Imperceptible

Local Residents & Community	Sensitive Aspect	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • Very low magnitude of increased magnetic fields
		<p>All Elements of the Whole UWF Project with Other Projects or Activities</p> <p><u>Cumulative Impact Magnitude:</u> Cumulative impacts with Other Projects relates to the combined impact of the 110kV UGC and the existing 220kV OHL. 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 in Mountphilips which is within 100m of both the existing 220kV and the 110kV UGC 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.</p> <p>Significance of the Cumulative Impact: Imperceptible</p> <p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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

Topic	Air

12.2.4.6 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 12-22 below.

Table 12-22: Description and Rationale for Excluded Impacts to Local Residents & Community

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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
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, 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 internal nuisance to residents	Rationale for Excluding: Neutral effects, there will be no sources of significant vibration during the construction stage of the <u>UWF Grid Connection</u> or the <u>UWF Related Works</u> , 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 to neutral effects on Local Residents & Community.
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 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 (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 .
Operational Stage				

Decommissioning Stage

12.2.5 Mitigation Measures for Impacts to Local Residents & Community

Mitigation measures were incorporated into the UWF Replacement Forestry project design. Additional mitigation measures are not relevant as **impacts to Local Residents & Community will be Neutral or None** as a consequence of the UWF Replacement Forestry.

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 the Evaluation of UWF Replacement Forestry (Section 12.2.1), i.e. **Neutral or None**.

12.2.7 Application of Best Practice and the EMP for Local Residents & Community

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Local Residents & Community.

12.2.8 Summary of Impacts to Local Residents & Community

The topic authors conclude that impacts to Local Residents & Community will be Neutral or None.

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 12-23: 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	Interference with Electronic Equipment
<i>Evaluation Impact Table (for Other Elements only)</i>	<i>Section 12.2.4.1</i>	<i>Section 12.2.4.2</i>	<i>Section 12.2.4.3</i>	<i>Section 12.2.4.4</i>	<i>Section 12.2.4.5</i>
Project Life-Cycle Stage <i>(for Other Elements only)</i>	Construction	Construction	Operational Stage	Operational Stage	Operational Stage
<u>UWF Replacement Forestry</u>	Neutral Impacts or No Potential for Impacts Evaluated as Excluded - see Section 12.2.1				
Element 1: UWF Grid Connection	Slight	Moderate	No Impact	Imperceptible	Imperceptible to Slight
Element 2: UWF Related Works	Slight	Moderate	No Potential for Impact	Imperceptible	Imperceptible
Element 4: Upperchurch Windfarm	No significant Impact	Not be Significant	Moderate	No Impact	No Impact
Element 5: UWF Other Activities	Neutral Impacts or No Impacts - Evaluated as Excluded, see Section 12.2.2.1				
<u>Cumulative Impact: (Other Elements only)</u>					
All Other Elements of the Whole UWF Project	Slight	Moderate	No Potential for Cumulative Impact	Imperceptible	Imperceptible
All Other Elements of the Whole UWF Project <u>cumulatively with</u> Other Projects or Activities Shannonbridge – Killonan 220kV OHL	No Potential for Impact - Evaluated as Excluded, see Section 12.2.2.1			Imperceptible	Imperceptible

(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 Replacement Forestry).

12.3 Sensitive Aspect No.2: Transient People

This Section provides a description and evaluation of the Sensitive Aspect - Transient People.

12.3.1 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

12.3.1.1 Baseline Characteristics of Transient People in relation to UWF Replacement Forestry

Transient People relate to farm/forestry workers and walkers/cyclists. 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. The UWF Replacement Forestry is surrounded by agricultural and forestry lands, while a waymarked cycle route, Ormond Way, is routed along the local road to the west, access to the new woodland is off this local road.

Any transient people present within the surrounding area of the UWF Replacement Forestry, 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 (NO₂, PM₁₀ and PM_{2.5}) in this area are substantially below the EU limit values. 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.

12.3.1.2 UWF Replacement Forestry Project Design

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the UWF Replacement Forestry – 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 12-17 are relevant to **Transient People**.

Table 12-24: UWF Replacement Forestry Project Design Measures relevant to Transient People

PD ID	Project Design Environmental Protection Measure (PD)
RF-PD-02	The lands will be planted by hand, using spades and hand tools.

12.3.1.3 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Transient People.

It was evaluated by the topic authors that **impacts to Transient People will be Neutral or None** due to the development of the UWF Replacement Forestry, for the following reasons:

- 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 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 the local road, therefore it is considered that neutral noise related impacts will occur 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.

12.3.1.4 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry will not Neutral or no impacts to Transient People by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 12.2.2 to Section 12.2.4** and included in the summary table in **Section 12.2.8** in order to show the totality of the project.

Transient People

Sensitive Aspect

Air

Topic

12.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

12.3.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Transient People 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 12.3.2.2.1](#) below.

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 Replacement Forestry 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 \(Section A2.3 .1 and Section A2.3. 12\)](#).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Transient People with UWF Replacement Forestry however in order to present the totality of the project – the existing Shannonbridge – Killonan 220 kV OHL and Killonan – Nenagh 110kV OHL and the consented Castlewaller Windfarm has been scoped in for evaluation of cumulative effects relating to the Other Elements.

12.3.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 12-24.

Table 12-25: 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 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.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Project or Activity: Shannonbridge – Killonan 220 kV OHL; Killonan – Nenagh 110kV OHL Castlewaller Windfarm (consented) 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 Replacement Forestry.	EMF: Lands, roads and waymarked walking trails within 200m of UWF Grid Connection.	Potential for EMF emissions coming from different directions and therefore the distance from the source was doubled

12.3.2.2.1 Potential for Impacts to 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 12-25.

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 12.3: Transient People within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 12-26: 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 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	<p>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.</p>
Other Projects or Activities	
Shannonbridge – Killonan 220 kV OHL;	Yes, included for the evaluation of cumulative effects
Killonan – Nenagh 110kV OHL Castlewaller Windfarm (consented)	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 Replacement Forestry.

12.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

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 UWF Grid Connection/UWF Related Works or Upperchurch Windfarm, or within 100m of operational electrical plant associated with these Elements, such as underground cables, substations and wind turbines. Electronic equipment such as Artificial Implanted Medical Devices (AIMDs) may also be worn by Transient People.

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.

The potential locations where Transient People may be present within the Cumulative Evaluation Study Area are identified in Table 12-24 and illustrated on [Figure CE 12.3](#).

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 (NO₂, PM₁₀ 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.

12.3.2.3.1 Element 1: UWF Grid Connection, Element 2: UWF Related Works, Element 4: Upperchurch Windfarm

12-27: Transient People within the UWF Grid Connection Study Areas

Project	<u>Transient People within 350m of Construction Works Areas (Air Quality, N-oise, Vibration)</u>	<u>Transient People within 50m of Materials Haulage Routes (Air Quality)</u>	<u>Transient People within 100m Of Electrical Parts (EMF)</u>
UWF Grid Connection	<ul style="list-style-type: none"> • Farm and forestry workers on lands within 350m of construction works areas, • Walkers/cyclists on roads within 350m of the 13 No. road crossing locations • Walkers/cyclists on those parts of the Slievefelim Way, Kilcommon Pilgrim Loop and Ormond Way Cycle Route within 350m of construction works areas or private road haulage routes 	<p>Walkers/cyclists on material haulage routes on the following local roads between the R503 and the site entrances: L-2166-0, L-2156-11, L-2157-5, L-6011-10, L-95032-8, L-21141-0, L-2114-0, L6085-0, L-6086-5, L-2266-0, R-497-0 and L-2264-50.</p>	<ul style="list-style-type: none"> • Farm and forestry workers on lands within 100m of the Mountphilips Substation and/or the 110kV UGC • All road users within 100m of the 13 No. road crossing points of the 110kV UGC • Walkers/cyclists on those parts of the Slievefelim Way, Kilcommon Pilgrim Loop, Ormond Way Cycle Route within 100m of the 110kV UGC
UWF Related Works	<ul style="list-style-type: none"> • 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 	<p>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.</p>	<ul style="list-style-type: none"> • 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.

Transient People	Project	<u>Transient People within 350m of Construction Works Areas (Air Quality, Noise, Vibration)</u>	<u>Transient People within 50m of Materials Haulage Routes (Air Quality)</u>	<u>Transient People within 100m Of Electrical Parts (EMF)</u>
		Sensitive Aspect		
	Upperchurch Windfarm	<ul style="list-style-type: none"> • Farm and forestry workers on lands within 350m of construction works areas, • Walkers/cyclists on roads within 350m of the 11 no. site entrances, • Walkers/cyclists on those parts of the Eamonn a Chnoic Loop or Ormond Way Walking Route, 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.	<ul style="list-style-type: none"> • Farm and forestry workers and walkers on lands within 100m of the Consented UWF Substation and Consented UWF Turbines.

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 or the consented Castletwaller windfarm (when built and operational).

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 Replacement Forestry.

12.3.2.4 Cumulative Information Baseline Characteristics - Importance of 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

12.3.2.5 Cumulative Information Baseline Characteristics - Sensitivity of Transient People

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 PM₁₀, are well below the objective limit and substantially less than 24 µg/m³, 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

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.

12.3.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)

Air Quality: If the works do not proceed, the baseline levels of dust including PM₁₀ and PM_{2.5} are likely to remain at existing levels. In Ireland the primary sources of Particulate Matter (PM₁₀ 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.

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.

12.3.2.7 Cumulative Information Baseline Characteristics - 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 & vibration: The Milestone wind farm is currently under construction, construction works will be completed in Summer 2018. The Milestone Grid Connection which travels south through Hollyford along the regional road, is scheduled to be completed by July 2018. Therefore there will be no overlap of construction periods. The Milestone windfarm is expected to be operational in August 2018, therefore the baseline noise environment in the vicinity of Milestone wind farm will have altered by August 2018.

It is not expected that the Castlewaller Windfarm will either be constructed or have started construction by the time the Grid Connection commences construction, therefore the receiving noise environment in the Castlewaller area is expected to be the same as the baseline at the time of the construction of the Grid Connection.

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 .

12.3.3 Cumulative Information: PROJECT DESIGN MEASURES for Transient People

There are no Project Design Environmental Protection Measures specific to Transient People.

12.3.4 Cumulative Information: EVALUATION OF IMPACTS to Transient People

It is evaluated that UWF Replacement Forestry has no potential to cause impacts to Transient People, see Section 12.2.1.

This Section presents the likely cumulative effects of the Other Elements of the Whole UWF Project. The cumulative effects of the Other Elements with Other Projects or Activities is also presented.

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) - Transient People.

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

Table 12-28: List of all Impacts included and excluded from the Impact Evaluation Table sections

<u>Impacts Included</u> (Evaluated in the Impact Evaluation Table sections)	<u>Impacts Excluded</u> (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)
Interference with Electronic Equipment (Operational 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 12.2.4.1 to 12.2.4.2.**

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 12.2.4.3.

12.3.4.1 Impact Evaluation Table: Increase in Ambient EMF Levels

Evaluation of UWF Replacement Forestry Excluded: As there will be no sources of EMF, there will be no potential for UWF Replacement Forestry to cause increases in ambient EMF levels by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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: Mountphilips Substation, 110kV UGC, Internal Windfarm Cabling (UWF Related Works), 110kV Overhead line, 220kV Overhead line, Internal windfarm cabling (Castlewaller)	
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 of the Whole UWF Project – i.e. the Mountphilips Substation, 110kV UGC, Internal Windfarm Cables, Consented UWF Turbines and Consented UWF Substation. Details of the modelling of worst case EMF emissions are included in Appendix 12.3 Explanation and Modelling of EMF .	
Impact Quality: Negative	

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 worse case scenario conditions at the substation fence.
110kV UGC: Any farm or forestry works, walkers, <u>cycles</u> 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. The worst case levels of 54μT magnetic field will be directly over the 110kV. Levels of EMF drop off quickly with distance and at 10m, 30m and 50m from the 110kV UGC, the worst case magnetic field levels will be 1.16 μT, 0.13 μT and 0.05μT, 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: 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

Transient People	Element 2: UWF Related Works	
	<p><u>Impact Magnitude:</u> Any farm or forestry works, walkers and cyclists, or road users on public roads within 100m of the Internal Windfarm Cables will 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. <u>Magnitude Result:</u> Very Low</p>	
Sensitive Aspect	<u>Significance of the Impact:</u> Imperceptible	
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> 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 4: Consented Upperchurch Windfarm	
	<p><u>Impact Magnitude:</u> 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 worse case scenario conditions. 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. <u>Magnitude Result:</u> Very Low, Low</p>	
	<u>Significance of the Impact:</u> Imperceptible	
	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> 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	
Air	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 Replacement Forestry.)	
Topic	Other Project: Shannonbridge – Killonan 220 kV OHL	
	<p><u>Impact Magnitude:</u> 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. <u>Magnitude Result:</u> Medium</p>	
	<u>Significance of the Impact:</u> 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

Other Project: Consented Castlewaller Windfarm

Impact Magnitude: Any forestry workers within 100m of the Castlewaller Windfarms internal 33kV cables will be exposed to increased magnetic field levels. The worst case levels of magnetic field will be directly over the 33kV cables and will be 2.4 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: Low

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the Low magnitude of the increased magnetic fields of 2.4 μT
- 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

Evaluation of Cumulative Impacts – Increase in ambient EMF levels

All Elements of the Whole UWF Project

Cumulative Impact Magnitude: The local road L-2264-50, some agricultural and forestry lands and a short section of the Ormond Way cycle route will be within 100m of both the 110kV UGC and the Internal Windfarm Cabling in Knockmaroe/Knockcurraghbola townlands (The Internal Windfarm Cabling routed parallel to the 110k UGC will have a worst case possible level of 1.8 μT). The worst case possible cumulative levels will be at public road crossing points or on lands which are directly over the two trenches, where worst case levels will be 55.8 μT .

On the Upperchurch Windfarm site, farm and forestry workers and walkers on the Ormond Way and the Eamonn a Chnoic Loop will be within 100m of both the Internal Windfarm Cabling and the Consented UWF Turbines in close proximity to the turbines. The worst case possible cumulative increase in magnetic field levels will be beside the turbine towers and over Internal Windfarm Cabling, where levels will be 7.8 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: Imperceptible to Slight

<div>Transient People</div> <div>Sensitive Aspect</div>	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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.
	<p>All Elements of the Whole UWF Project with Other Projects or Activities</p> <p><u>Cumulative Impact Magnitude:</u> Cumulative impacts with Other Projects only relates to UWF Grid Connection.</p> <p><u>110kV UGC and 220kV OHL or 110kV OHL:</u> 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.</p> <p>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.</p> <p>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.</p> <p><u>110kV UGC and Castlewaller Windfarm internal 33kV cables:</u> The worst case combination ambient magnetic field levels for transient people which are within 100m of both the 110kV UGC and the Castlewaller Windfarm internal cables would be 56.4 μT, at the point directly above the intersection of both cables on a forestry road.</p> <p>There is no potential for cumulative effects with more than one Other Project at any location, due to the separation distances between the 220kV OHL and the 110kV OHL and the Castlewaller Windfarm.</p> <p>Details of the increase in magnetic fields are included in Appendix 12.3 Explanation and Modelling of EMF.</p>
<div>Air</div> <div>Topic</div>	<p>Significance of the Cumulative Impact: Imperceptible to Slight</p>
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 Medium cumulative magnitude of magnetic fields at Castlewaller of 56.4 μT, directly above the crossing point of the 110kV UGC and the Castlewaller Windfarm Internal 33kV Cable • 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.

12.3.4.2 Impact Evaluation Table: Interference with Electronic Equipment

Evaluation of UWF Replacement Forestry Excluded: As there will be no sources of EMF, there will be no potential for UWF Replacement Forestry to cause interference to electronic equipment by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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: Mountphilips Substation, 110kV UGC (UWF Grid Connection), Internal Windfarm Cabling (UWF Related Works), 110kV OHL, 220kV OHL, Castlewaller Windfarm internal windfarm cables.	
Impact Pathway: Air/Ground	
Impact Description: There will be some increase in ambient electromagnetic field levels in local residences, on way marked routes, public roads, and on agricultural and forestry lands which are within 100m of electric plant, such as substations and high voltage cables or lines.	
Impact Quality: Negative	

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

Element 1: UWF Grid Connection

Impact Magnitude: Any farm or forestry machinery within 100m of the Mountphilips Substation will be Impact Magnitude:
Any AIMD worn by farm or forestry workers within 100m of the Mountphilips 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.
Any AIMD worn by farm or forestry workers or walkers/cyclists on waymarked trails or road users on public roads, within 100m of the 110kV UGC will be exposed to increased magnetic field levels. The worst case levels of magnetic field will be directly over the 110kV and would be 54μT. No increase in electric fields from the 110kV UGC 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: Very Low, Low, Medium – depending on location

Significance of the Impact: Slight (for electronic equipment directly over the 110kV UGC)

Rationale for Impact Evaluation:

Rationale for Impact Evaluation:

- The Low magnitude of the worst-case increased electric field of 40V/m and
 - The Very Low magnitude of increased magnetic fields of 1μT at the Mountphilips Substation
 - the Medium magnitude of the increased magnetic fields of 54μT directly above the 110kV UGC.
 - the momentary to brief exposure of any transient equipment present
 - the occasional nature of any exposure
- the reversibility of the exposure as the machine or person wearing an AIMD moves away from the location of the underground cables

Transient People	Sensitive Aspect	Element 2: UWF Related Works <p><u>Impact Magnitude:</u> Any AIMD worn by farm or forestry workers or walkers/cyclists on waymarked trails or road users on public roads, within 100m of the Internal Windfarm Cabling will be exposed to increased magnetic field levels. The worst case levels of magnetic field will be directly over the underground cables will be 7.6 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</p> <p><u>Magnitude Result:</u> Low & Very Low</p> <p><u>Significance of the Impact:</u> Imperceptible</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> the Low magnitude of the increased magnetic fields of 7.6μT the momentary to brief exposure the occasional nature of any exposure the reversibility of the exposure as the machine or person wearing an AIMD moves away from the location of the underground cables
		Element 4: Consented Upperchurch Windfarm <p><u>Impact Magnitude:</u></p> <p>Any AIMD worn by farm or forestry workers or walkers/cyclists on waymarked trails or road users on public roads, 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.</p> <p>Any AIMD worn by farm or forestry workers or walkers 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.</p> <p><u>Magnitude Result:</u> Low & Very Low</p> <p><u>Significance of the Impact:</u> Imperceptible</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> The Low magnitude of the worst-case increased electric field of 40V/m at the Consented UWF Substation The Very Low magnitude of increased magnetic fields at the Consented UWF Substation and the Consented UWF Turbines (1 μT and 0.2 μT respectively) The momentary to brief exposure of any transient equipment present The occasional nature of any exposure The reversibility of the exposure as the machine or person wearing an AIMD moves away from the location of the underground cables
Air	Topic	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. <u>There is no potential for cumulative effects with the UWF Replacement Forestry.</u>)
		Other Project: Shannonbridge – Killonan 220 kV OHL
		<p><u>Impact Magnitude:</u> Any AIMD worn by transient people within 100m of the 220kV OHL will be exposed to increased magnetic and electric field levels. The worst case levels associated with the 220kV OHL will be directly underneath it, with worst case magnetic fields of 25.7 μT and electric fields of 3.5 kV/m.</p> <p><u>Significance of the Impact:</u> Slight</p> <p><u>Rationale for Impact Evaluation:</u></p>

- the Low/Medium magnitude of the existing magnetic and electric fields of 25.7 μT and 3.5 kV/m under the line
- the momentary to brief exposure of any transient equipment present
- the occasional nature of any exposure
- the reversibility of the exposure as the person wearing an AIMD moves away from the location of the overhead line

Other Project: Killonan – Nenagh 110kV OHL

Impact Magnitude: Any AIMD worn by transient people within 100m of the 110kV OHL will be exposed to increased magnetic and electric field levels. The worst case levels associated with the 110kV OHL will be directly underneath it, with worst case magnetic fields of 15 μT and electric fields of 1.3 kV/m.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- the Low/Medium magnitude of the existing magnetic and electric fields of 15 μT and 1.3 kV/m under the line,
- the momentary to brief exposure of any transient equipment present
- the occasional nature of any exposure
- the reversibility of the exposure as person wearing an AIMD moves away from the location of the overhead line

Other Project: Consented Castlewaller Windfarm

Impact Magnitude: Any AIMD worn by transient people within 100m of the Castlewaller Windfarm internal cables will be exposed to increased magnetic field levels. The worst case levels of magnetic field will be directly over the 33kV cables and will be 2.4 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.

Significance of the Impact: imperceptible to slight

Rationale for Impact Evaluation:

- the Low magnitude of the increased magnetic fields of 2.4 μT directly above the internal windfarm cables.
- the momentary to brief exposure of any transient equipment present
- the occasional nature of any exposure
- the reversibility of the exposure as the person wearing an AIMD moves away from the location of the underground cables

Evaluation of Cumulative Impacts – Interference with Electronic Equipment

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:

Any AIMD worn by farm or forestry workers on agricultural and forestry lands in Knockmaroe/Knockcurraghbola townlands or cyclists/road users on the local road L-2264-50, could be within 100m of both the 110kV UGC and the Internal Windfarm Cabling at the same time. The worst case possible levels will be at public road crossing points or on lands which are directly over the two trenches, where worst case levels will be 55.8 μT (the Internal Windfarm Cabling routed parallel to the 110k UGC will have a worst case possible level of 1.8 μT).

On the Upperchurch Windfarm site, any AIMD worn by farm or forestry workers or by walkers on the Eamonn a Chnoic or Ormond Way (when developed) could be within 100m of both the Internal Windfarm Cabling and the Consented UWF Turbines at the same time. The worst case possible cumulative increase in magnetic field levels will be beside the turbine towers, where worse case levels will be 7.8 μT .

<div>Transient People</div> <div>Sensitive Aspect</div>	<p>No in combination effects will occur at any other location and any increases in electric or magnetic fields will be as described above.</p> <p><u>Magnitude Result:</u> Very Low, Low, Medium – depending on location</p>
	<p><u>Significance of the Cumulative Impact: Slight</u></p> <p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • The Low magnitude of the worst-case increased electric field of 40V/m • Very low magnitude of increased magnetic fields (1 μT) at either 110kV substation • The Medium magnitude of the increased magnetic fields of 54μT directly above the 110kV UGC and near either substation. • The Medium magnitude of the increased magnetic fields of 55.8μT directly above the 110kV UGC and Internal Windfarm Cabling in Knockmaroe and Knockcurraghbola area. • the momentary to brief exposure of any transient equipment present • the occasional nature of any exposure • the reversibility of the exposure as the person wearing an AIMD moves away from the location of the underground cables.
<div>Air</div> <div>Topic</div>	<p>All Elements of the Whole UWF Project with Other Projects or Activities</p> <p><u>Cumulative Impact Magnitude:</u> Cumulative impacts with Other Projects only relates to UWF Grid Connection.</p> <p><u>Mountphilips Substation and 110kV OHL Impact Magnitude:</u> The worst case combination ambient magnetic field levels for farm or forestry machinery or AIMD worn by workers within 100m of both the Mountphilips Substation and the 110kV OHL would be 69 μT. There are no cumulative electric field levels as the parts of the Mountphilips Substation which will emit electric fields are greater than 100m from the 110kV OHL.</p> <p><u>110kV UGC and 220kV OHL or 110kV OHL Impact Magnitude:</u> The worst case combination ambient magnetic field levels for AIMD worn by farm or forestry workers, or road users, within 100m of both the UWF Grid Connection 110kV UGC and the 110kV OHL or within 100m of both the 110kV UGC and the 220kV OHL would be 69μT and 79.7 μT respectively, at the points directly above the 110kV UGC and directly under the OHLs.</p> <p>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</p> <p>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.</p> <p><u>110kV UGC and Castlewaller Windfarm internal 33kV cables Impact Magnitude:</u> The worst case combination ambient magnetic field level for AIMD worn by transient people which are within 100m of both the 110kV UGC and the Castlewaller Windfarm internal cables would be 56.4 μT, at the point directly above the intersection of both cables on a forestry road.</p> <p>There is no potential for cumulative effects with more than one Other Project, at any location, due to the separation distances between the 220kV OHL and the 110kV OHL and the Castlewaller Windfarm. Details of the increase in magnetic fields are included in Appendix 12.3 Explanation and Modelling of EMF.</p>
	<p><u>Significance of the Cumulative Impact: Slight</u></p> <p><u>Rationale for Cumulative Impact Evaluation:</u></p>

- the Medium cumulative magnitude of magnetic fields at Mountphilips of 79.7 μT and 69 μT under the 220kV OHL and the 110kV OHL, respectively
- the Medium Magnitude of the cumulative magnetic field levels of 56.4 μT at Castlewaller
- the momentary to brief exposure of any transient equipment present
- the occasional nature of any exposure
- the reversibility of the exposure as the person wearing an AIMD moves away from the location of the underground cables

Transient People

Sensitive Aspect

Air

Topic

12.3.4.3 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 12-28 below.

Table 12-29: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
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	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

Transient People

Sensitive Aspect

Air

Topic

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Excavation and storage of materials				where waymarked trails come into close proximity with construction works areas. In 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 <u>UWF Grid Connection</u> or the <u>UWF Related Works</u> , 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

Transient People

Sensitive Aspect

Air

Topic

Sensitive Aspect	Transient People	Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)	
		Decommissioning Stage					
		Rationale for Excluding: No potential for effects/Neutral effects:					
		<u>UWF Grid Connection</u> : 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.					
		<u>UWF Related Works</u> : 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.					
<u>Upperchurch Windfarm</u> ; Neutral impact –It is likely that the Consented UWF Substation will remain in-situ for use by ESNB, 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.							

Air

Topic

12.3.5 Mitigation Measures for Impacts to Transient People

Mitigation measures were incorporated into the UWF Replacement Forestry project design. Additional mitigation measures are not relevant as **impacts to Transient People will be Neutral or None** as a consequence of the UWF Replacement Forestry.

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 the Evaluation of UWF Replacement Forestry (Section 12.2.1), i.e. **Neutral or None**.

12.3.7 Application of Best Practice and the EMP for Transient People

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Transient People.

12.3.8 Summary of Impacts to Transient People

The topic authors conclude that impacts to Transient People will be Neutral or None.

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 12-30: Summary of the impacts to Transient People

Impact to Transient People:	Increase in Ambient EMF Levels	Interference with Electronic Equipment
<i>Evaluation Impact Table (relates to Other Elements)</i>	<i>Section 12.3.4.1</i>	<i>Section 12.3.4.2</i>
Project Life-Cycle Stage (relates to Other Elements)	Operational Stage	Operational Stage
<u>UWF Replacement Forestry</u>	Neutral Impacts or No Potential for Impacts Evaluated as Excluded - see Section 12.3.1	
Element 1: UWF Grid Connection	Imperceptible to Slight	Slight
Element 2: UWF Related Works	Imperceptible	Imperceptible
Element 4: Upperchurch Windfarm	Imperceptible	Imperceptible
Element 5: UWF Other Activities	Neutral Impacts or No Impacts - Evaluated as Excluded, see Section 12.3.2.2.1	
<u>Cumulative Impact: (Other Elements only)</u>		
All Other Elements of the Whole UWF Project	Imperceptible to Slight	Slight
All Other Elements of the Whole UWF Project <u>cumulatively with</u> Other Projects or Activities Shannonbridge – Killonan 220 kV OHL; Killonan – Nenagh 110kV OHL Castlewaller Windfarm (consented)	Imperceptible to Slight	Slight

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 Replacement Forestry

Transient People

Sensitive Aspect

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 the 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.*

12.5 Best Practice Measures

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Air.

12.6 Summary of the Air Chapter

UWF Replacement Forestry 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 Kilcommon and Upperchurch.

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.

12.6.1 Summary of UWF Replacement Forestry Impacts

- No Impacts or Neutral Impacts are expected to occur to Local Residents & Community and to Transient People, this is due to the planting of the lands by hand, which avoids both the use of large machinery and the presence of large volumes of excavated soils, and due to the very low level of activities associated with annual management during the growth stage. In addition, as the UWF Replacement Forestry does not include any electrical or communications equipment, the new woodland will not contribute to EMF levels in the vicinity.

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

As UWF Replacement Forestry 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, UWF Related Works and Upperchurch Windfarm).

- UWF Replacement Forestry will not contribute to cumulative impacts to Local Residents & Community or Transient People.
- Cumulative impacts to Local Residents & Community of the Other Elements of the Whole UWF Project with each other will be no greater than Slight in relation to increases in ambient dust levels, Moderate in relation to ambient noise levels during construction and Imperceptible in relation to increased EMF emissions.
- Cumulative impacts to Transient People of the Other Elements of the Whole UWF Project with each other (UWF Related Works, UWF Grid Connection and Upperchurch Windfarm) will be no greater than Imperceptible to Slight in relation to increases in EMF emissions.

12.6.3 Summary of Cumulative Impacts with Other Projects or Activities

There is no potential for cumulative impacts of UWF Replacement Forestry 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.

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- Ecopower Developments Ltd. (2013) Upperchurch Windfarm Response to Further Information 13510003
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- An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040

UWF Replacement Forestry EIA Report

Volume C2: EIAR Main Report

Chapter 13: Climate

Topic Chapter Authors:



EIAR Coordinator:



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Topic	Climate
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Contents

13	Environmental Factor: Climate	1
13.1	Introduction to the Climate Chapter	1
13.1.1	What is Climate?	1
13.1.2	Overview of Climate in the Local Environment	1
13.1.3	Sensitive Aspects of the Climate Environment included for further evaluation	1
13.1.4	Sensitive Aspects excluded from further evaluation	1
13.1.5	Overview of the Subject Development	2
13.1.6	The Author of the Climate Chapter	2
13.1.7	Sources of Baseline Information	2
13.1.7.1	Certainty and Sufficiency of Information Provided	3
13.1.8	Methodology for Evaluating Effects	4
13.1.8.1	Carbon sequestration	4
13.2	Sensitive Aspect No.1: Climate	5
13.2.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	5
13.2.1.1	Baseline Characteristics of Climate in relation to UWF Replacement Forestry	5
13.2.1.2	Evaluation of UWF Replacement Forestry	5
13.2.1.3	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	5
13.2.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	6
13.2.2.1	Overview of Other Elements, Other Projects or Activities	6
13.2.2.2	Cumulative Evaluation Study Area	6
13.2.2.3	Cumulative Information: Baseline Characteristics – Context & Character	8
13.2.2.4	Cumulative Information Baseline Characteristics - Importance of Climate	10
13.2.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Climate	10
13.2.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	11
13.2.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	11
13.2.3	Cumulative Information: PROJECT DESIGN MEASURES for Climate	12
13.2.4	Cumulative Information: EVALUATION OF IMPACTS to Climate	13
13.2.4.1	Impact Evaluation Table: Increase in Renewable Energy Production	14
13.2.5	Mitigation Measures for Impacts to Climate	16
13.2.6	Evaluation of Residual Impacts to Climate	16
13.2.7	Application of Best Practice and the EMP for Climate	16
13.2.8	Summary of Impacts to Climate	17
13.3	Policy Context	19

13.3.1	National Policy	19
13.3.2	Regional Policy.....	19
13.3.3	North Tipperary County Development Plan 2010 (as varied):	19
13.4	Best Practice Measures	20
13.5	Summary of the Climate Chapter	21
13.5.1	Summary of UWF Replacement Forestry Impacts	21
13.5.1	Summary of the Cumulative Impacts of the Other Elements of the Whole UWF Project	21
13.5.2	Summary of the Cumulative Impacts with Other Projects or Activities.....	21
13.6	Reference List	22

List of Figures

<u>Figure No.</u>	<u>Figure Title</u>
No Figures associated with this topic chapter	

List of Appendices

<u>Appendix No.</u>	<u>Appendix Title</u>
No Appendices associated with this topic chapter	

Glossary of Terms

<u>Term</u>	<u>Definition</u>
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
CO₂eq	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 ₂ eq 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.

Climate
Topic

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 atmosphere's 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. EPA projections indicate that Ireland will breach our annual obligations from 2016 onwards 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
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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 Replacement Forestry is the subject development, being the subject of a current afforestation license application to the Minister for Agriculture, Food and the Marine.

Table 13-1: Subject Development –UWF Replacement Forestry

<u>Project ID</u>	<u>The Subject Development</u>	<u>Composition of the Subject Development</u>
Element 3	The Subject Development UWF Replacement Forestry (RF)	Replacement Forestry at Foilnaman

Note: The UWF Replacement Forestry is 'Element 3' 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 Replacement Forestry \(Volume C2 EIAR Main Report\)](#).

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

<u>Type</u>	<u>Source</u>
Guidelines	<ul style="list-style-type: none"> UK Environment Agency carbon calculator for construction sites (Version 3.6, 2014)¹
Desktop	<ul style="list-style-type: none"> 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 <p>Consented Upperchurch Windfarm planning documents</p> <ul style="list-style-type: none"> Ecopower Developments Ltd. (2013) Upperchurch Windfarm Environmental Impact Statement 13510003 Ecopower Developments Ltd. (2013) Upperchurch Windfarm Response to Further Information 13510003

¹ UK Environment Agency Carbon Calculator for Construction Activities (2014)

<u>Type</u>	<u>Source</u>
	<ul style="list-style-type: none"> An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040
Fieldwork	<ul style="list-style-type: none"> 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 CO₂ uptake rate for tree stands of the order of 5 – 20 tonnes of CO₂ / hectare/ year with CO₂ 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 CO₂ / hectare/ year²

According to Morrison et al.² a Sitka spruce plantation has a maximum CO₂ sequestration rate of 20.5 tonnes of CO₂ / hectare/ year over a 40-year period, based on British forests. A long-term CO₂ uptake rate of 3.2 tonnes of CO₂ / hectare/ year can be applied to provide a conservative estimate of the uptake rate associated with this type of plantation.

A maximum CO₂ sequestration rate of 13 tonnes of CO₂ / hectare/ year over a 55-year period can be applied to Oak plantations (a native species to Ireland). A long-term CO₂ uptake rate of 2.1 tonnes of CO₂ / 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 REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

13.2.1.1 Baseline Characteristics of Climate in relation to UWF Replacement Forestry

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 industries³. 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 Replacement Forestry is located in County Tipperary and is one Element of the Whole UWF Project, which includes the already Consented Upperchurch Windfarm.

13.2.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Climate.

It was evaluated by the topic authors that UWF Replacement Forestry **will cause Neutral impacts to Climate**, for the following reasons

- 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.

13.2.1.3 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry will not cause impacts to Climate by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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.

³ EPA (2017) Ireland's Final Greenhouse Gas Emissions 2015 and previous reports (2011 -2014)

13.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

13.2.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Climate 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 13.2.2.2.1](#) below.

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 either the UWF Replacement Forestry 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 \(Section A2.3 .1 and Section A2.3. 13\)](#).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Climate with UWF Replacement Forestry however in order to present the totality of the project – Operational Windfarms in the Republic of Ireland have been scoped in for evaluation of cumulative effects relating to the Other Elements.

13.2.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 13-3.

Table 13-3: 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 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Project or Activity: Operational Windfarm in the Republic of Ireland		
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 Replacement Forestry.		

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	<p><u>Evaluated as excluded</u>: 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,</p> <p>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 CO₂,</p> <p>Neutral impacts to Climate due to forestry felling, as the loss of forested land results in the loss of an area capable of uptaking 28.6 tonnes of CO₂/yr which is equivalent to substantially less than 1% of Ireland's 2020 national emission ceiling for CO₂.</p> <p>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.</p>
Element 2: UWF Related Works	<p><u>Evaluated as excluded</u>: No potential for effects/Neutral effects due to 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</p> <p>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 CO₂,</p> <p>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 CO₂/yr which is equivalent to substantially less than 1% of Ireland's 2020 national emission ceiling for CO₂.</p> <p>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,</p> <p>There will be a Neutral impact to climate as a result of decommissioning activities due to the low volume of machinery and vehicles required.</p>
Element 4: Upperchurch Windfarm (UWF)	<p><u>Included for the evaluation</u> of cumulative effects in relation to Increasing Renewable Energy Production,</p> <p><u>Evaluated as excluded</u> 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</p>

Climate

Sensitive Aspect

Climate

Topic

<div>Climate</div> <div>Sensitive Aspect</div>		<p>mobile generators, as the emissions have been calculated at substantially less than 1% of Ireland's 2020 national emission ceiling for CO₂,</p> <p>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 CO₂/yr which is equivalent to substantially less than 1% of Ireland's 2020 national emission ceiling for CO₂.</p> <p>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,</p> <p>There will be a Neutral impact to climate as a result of decommissioning activities due to the low volume of machinery and vehicles required.</p>
	Element 5: UWF Other Activities	<p><u>Evaluated as excluded</u>: No potential for effects/Neutral Effects due to:</p> <p>No potential to positively directly impact Climate through increasing renewable energy production - the UWF Other Activities will not produce renewable electricity</p> <p>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.</p> <p>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.</p>
	Other Projects or Activities	
	Operational Windfarms in the Republic of Ireland	<p>Yes, <u>included</u> for the evaluation of cumulative effects</p> <p>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 Replacement Forestry.</p>

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 industries⁴. 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 Ireland's greenhouse gas emissions each year, the most recent available data is from 2015 and is based on the SEAI's final energy balances for 2015^{4,5}. 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

⁴ EPA (2017) Ireland's Final Greenhouse Gas Emissions 2015 and previous reports (2011 -2014)

⁵ SEAI (2016) Renewable Energy in Ireland 2015

GWP100 for carbon dioxide (CO₂) is the basic unit (GWP = 1) whereas methane gas (CH₄) has a global warming potential equivalent⁶ to 21 units of CO₂ and nitrous oxide (N₂O) has a GWP100 of 310.

Agriculture was the greatest source of emissions in 2015⁴ at 33% of CO₂eq. The next largest share of energy emissions in 2015 was from transport (19.8% of total emissions) and energy production (19.7% of total emissions). Waste represented 1.7% of total emissions in 2015⁴. Emissions from waste consist mainly of methane (CH₄) with small amounts of other GHGs.

Compliance with the European Union's Effort Sharing Decision "EU 2020 Strategy" (Decision 406/2009/EC⁷) has been assessed since 2013. In 2015, Ireland had non-ETS sector emissions of 43 Mt CO₂eq (1 Mt = 1 million tonnes), this is 1.63 Mt CO₂eq lower than Irelands annual target for emissions, therefore provided estimates for 2015 are correct, Ireland was in compliance with its EU 2020 target (EC Decision 406/2009/EC⁷) in 2015.

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 2: UWF Related Works

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.

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.

Climate

Sensitive Aspect

Climate

Topic

⁶ Greenhouse gases other than CO₂ (i.e. methane, nitrous oxide and so-called F-gases) may be converted to CO₂ equivalent using their global warming potentials, thereby providing a CO₂ equivalent or CO₂eq value.

⁷ 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

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 east⁸, this is evident in the increased flooding events in recent years. The EPA⁸ 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 concentrations⁹. 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.

⁸ EPA (2017) 'What impact will climate change have for Ireland'

<http://www.epa.ie/climate/communicatingclimatescience/whatisclimatechange/whatimpactwillclimatechangehaveforireland/>

⁹ Morison, J., Matthews, R., Miller, G., Perks, M., Randle, T., Vangelova, E., White, M. and Yamulki, S. (2012). 'Understanding the carbon and greenhouse gas balance of forests in Britain' Forestry Commission Research Report

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% increase in other non-ETS emissions. This change in trend is a result of increasing economic growth and employment. While Ireland has been in compliance with its EU 2020 target for the past number of years, projections would indicate that Ireland will breach this target in 2016/2017⁴.

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.

Climate
Sensitive Aspect

13.2.3 Cumulative Information: PROJECT DESIGN MEASURES for Climate
There are no Project Design Environmental Protection Measures specific to Climate

Climate
Topic

13.2.4 Cumulative Information: EVALUATION OF IMPACTS to Climate

It is evaluated that **UWF Replacement Forestry 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 <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (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.

13.2.4.1 Impact Evaluation Table: Increase in Renewable Energy Production

Evaluation of UWF Replacement Forestry Excluded: As the UWF Replacement Forestry will not produce electricity, there is no potential for UWF Replacement Forestry 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 Replacement Forestry 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
Impact Source: n/a	
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 2: UWF Related Works – *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 to 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 CO₂ emissions from fossil fuels.
- 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*

Climate

Sensitive Aspect

Climate

Topic

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 Replacement Forestry.

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 windfarms¹⁰. According to the SEAI 2016 Report on Renewable Electricity in Ireland 2015¹¹, the average generating capacity of Irish windfarms was 32%. Based on this capacity factor, avoiding the emissions of 6,070,101 tonnes of CO₂ 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.
- 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 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 CO₂ 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 CO₂ 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](#)).

¹⁰ Irish Wind Energy Association (IWEA) (2017) Windfarm Details by County <http://www.iwea.com/index.cfm/page/bycounty/id/9> Accessed 4 October 2017

¹¹ SEAI (2016) Renewable Electricity in Ireland 2015

Climate Sensitive Aspect	13.2.5 Mitigation Measures for Impacts to Climate
	Mitigation measures are not relevant as UWF Replacement Forestry 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 Replacement Forestry (Section 13.2.1), i.e. Neutral impacts .
	13.2.7 Application of Best Practice and the EMP for Climate
	No UWF Replacement Forestry Best Practice Measures have been developed specifically for Climate.

Climate
Topic

13.2.8 Summary of Impacts to Climate

The topic authors conclude that there is no potential for UWF Replacement Forestry to cause 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
<i>Evaluation Impact Table (for Other Elements only)</i>	<i>Section 13.2.4.1</i>
Project Life-Cycle Stage (for Other Elements only)	Operational Stage
<u>UWF Replacement Forestry</u>	Neutral Impact/No Impact Evaluated as Excluded - see Section 13.2.1
Element 1: UWF Grid Connection	Neutral Impact/No Impact - Evaluated as Excluded, see Section 13.2.2.2.1
Element 2: UWF Related Works	Neutral Impact/No Impact - Evaluated as Excluded, see Section 13.2.2.2.1
Element 4: Upperchurch Windfarm	Slight (positive)
Element 5: UWF Other Activities	Neutral Impact/No Impact - Evaluated as Excluded, see Section 13.2.2.2.1
<u>Cumulative Impact:</u> (for Other Elements only)	
All Elements of the Whole UWF Project (only relates to Upperchurch Windfarm)	No Cumulative Impact
All Elements of the Whole UWF Project <u>cumulatively with</u> 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 Replacement Forestry).

Climate
Sensitive Aspect

Climate
Topic

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 Government's 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.

13.4 Best Practice Measures

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Climate.

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 Replacement Forestry is one Element of the Whole Upperchurch Windfarm Project. The purpose of UWF Replacement Forestry is to fulfil replanting obligations as a result of the forestry felling associated with the Other Elements of the Whole UWF Project (in particular UWF Grid Connection, UWF Related Works and Upperchurch Windfarm).

13.5.1 Summary of UWF Replacement Forestry Impacts

- UWF Replacement Forestry has no potential to directly positively directly impact Climate through increasing renewable energy production - as the UWF Replacement Forestry 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 Replacement Forestry 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.

13.5.1 Summary of the Cumulative Impacts of the Other Elements of the Whole UWF Project

As UWF Replacement Forestry 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 Related Works 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.

13.5.2 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 Replacement Forestry 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**.

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UWF Replacement Forestry EIA Report

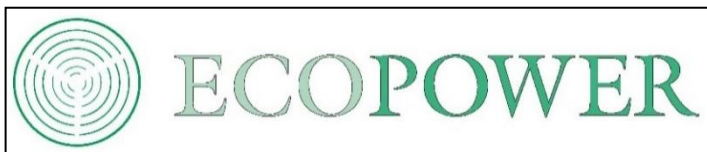
Volume C2: EIAR Main Report

Chapter 14: Material Assets (Built Services)

Topic Chapter Authors:



EIAR Coordinator:



Contents

14	Environmental Factor: Material Assets (Built Services).....	1
14.1	Introduction to the Material Assets (Built Services) Chapter	1
14.1.1	What is Material Assets (Built Services)?	1
14.1.2	Overview of Built Services in the Local Environment.....	1
14.1.3	Sensitive Aspects of the Built Services Environment included for further evaluation.....	2
14.1.4	Sensitive Aspects excluded from further evaluation.....	2
14.1.5	Overview of the Subject Development	3
14.1.6	The Authors of the Material Assets (Built Services) Chapter	3
14.1.7	Sources of Baseline Information	4
14.1.7.1	Certainty and Sufficiency of Information Provided	5
14.1.8	Methodology for Evaluating Effects	5
14.2	Sensitive Aspect No.1: Local Residents & Community	7
14.2.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	7
14.2.1.1	Baseline Characteristics of Local Residents & Community in relation to UWF Replacement Forestry.....	7
14.2.1.2	Evaluation of UWF Replacement Forestry	7
14.2.1.3	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	7
14.2.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	8
14.2.2.1	Overview of Other Elements, Other Projects or Activities.....	8
14.2.2.2	Cumulative Evaluation Study Area	8
14.2.2.3	Cumulative Information: Baseline Characteristics – Context & Character	9
14.2.2.4	Cumulative Information Baseline Characteristics - Importance of Local Residents & Community	11
14.2.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Local Residents & Community	11
14.2.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	11
14.2.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	11
14.2.3	Cumulative Information: PROJECT DESIGN MEASURES for Local Residents & Community	12
14.2.4	Cumulative Information: EVALUATION OF IMPACTS to Local Residents & Community.....	13
14.2.4.1	Cumulative Information: Description and Rationale for Excluding (scoped out) Impacts	14
14.2.5	Mitigation Measures for Impacts to Local Residents & Community.....	15
14.2.6	Evaluation of Residual Impacts to Local Residents & Community	15
14.2.7	Application of Best Practice and the EMP for Local Residents & Community	15
14.2.8	Summary of Impacts to Local Residents & Community	16
14.3	Sensitive Aspect No.2: Electricity Transmission System	17

14.3.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	17
14.3.1.1	Baseline Characteristics of Electricity Transmission System in relation to UWF Replacement Forestry.....	17
14.3.1.2	Evaluation of UWF Replacement Forestry	17
14.3.1.3	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	17
14.3.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	18
14.3.2.1	Overview of Other Elements, Other Projects or Activities.....	18
14.3.2.2	Cumulative Evaluation Study Area	18
14.3.2.3	Cumulative Information: Baseline Characteristics – Context & Character	20
14.3.2.4	Cumulative Information Baseline Characteristics - Importance of Electricity Transmission System	21
14.3.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Electricity Transmission System	21
14.3.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	21
14.3.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	21
14.3.3	Cumulative Information: PROJECT DESIGN MEASURES for Electricity Transmission System	22
14.3.4	Cumulative Information: EVALUATION OF IMPACTS to Electricity Transmission System	23
14.3.4.1	Cumulative Information: Description and Rationale for Excluded (scoped out) Impacts.....	24
14.3.5	Mitigation Measures for Impacts to Electricity Transmission System	25
14.3.6	Evaluation of Residual Impacts to Electricity Transmission System.....	25
14.3.7	Application of Best Practice and the EMP for Electricity Transmission System.....	25
14.3.8	Summary of Impacts to Electricity Transmission System.....	26
14.4	Policy Context	27
14.4.1	Regional Policy.....	27
14.4.2	North Tipperary County Development Plan 2010 (as varied):	27
14.5	Best Practice Measures	28
14.6	Summary of the Material Assets (Built Services) Chapter	29
14.6.1	Summary of UWF Replacement Forestry Impacts	29
14.6.2	Summary of the Cumulative Impacts with the Other Elements of the Whole UWF Project	29
14.6.3	Summary of the Cumulative Impacts with Other Projects or Activities.....	29
14.7	Reference List	30

List of Figures

<u>Figure No.</u>	<u>Figure Title</u>
Figure RF 14.1	Location of the UWF Replacement Forestry
Figure CE 14.2	Local Residents & Community (Built Services) within the Cumulative Evaluation Study Area
Figure CE 14.3	Electricity Transmission System within the Cumulative Evaluation Study Area

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

List of Appendices

<u>Appendix No.</u>	<u>Appendix Title</u>
Appendix 14.1	Location of Built Services and Built Service Users in the Study Area

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

Glossary of Terms

<u>Term</u>	<u>Definition</u>
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

<u>Abbreviation</u>	<u>Full Term</u>
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 respectively)
UGC	Underground Cables
UWF	Upperchurch Windfarm

Topic	Material Assets (Built Services)
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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. Underground services in the area comprise Irish Water mains, which are fed from a reservoir in Knocknabansha.

The location of the UWF Replacement Forestry is illustrated on OSI Mapping on [Figure RF 14.1: Location of the UWF Replacement Forestry](#).

Figures and mapping referenced in this topic chapter can be found in [Volume C3 EIAR Figures](#).

14.1.3 Sensitive Aspects of the 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)	<p>Evaluated as excluded, no likely effects/ Neutral effects</p> <p>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.</p> <p>Notwithstanding the above, Neutral impact (worst case impact) due to the very small extent (0.8 km of underground water pipes, 0.9km of overhead electricity lines, 2.9km of overhead telephone line, 0.02km of underground electricity cables and no 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 0.001% of the owner/operators national networks – 63,000km of water mains, 150,000km of electricity lines¹, and overhead telephone lines and underground Eir communication cables supplying c.2 million customers in Ireland².</p>
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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 Replacement Forestry is the subject development, being the subject of a current afforestation license application to the Minister for Agriculture, Food and the Marine.

Table 14-1: Subject Development –UWF Replacement Forestry

Project ID	The Subject Development	Composition of the Subject Development
Element 3	<u>The Subject Development</u> UWF Replacement Forestry (RF)	Replacement Forestry at Foilnahan

Note: The UWF Replacement Forestry is 'Element 3' 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 Replacement Forestry (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	<p>Feedback was received from:</p> <ul style="list-style-type: none"> • 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 <p>See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.</p>
Guidelines	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Review of Irish Water Services Mapping • Review of Eir Mapping • Modelling of microwave radio link paths to/from Foilnahan Telecommunications Mast • Review of ESN 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 <p>Consented Upperchurch Windfarm planning documents</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Site walkover of construction works areas • GPS survey of all existing Irish Water/Eir/ESBN networks within 20m of works areas, • Survey of Foilnahan 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.

Introduction, Authors, Sources, Methodology

Material Assets (Built Services)

Topic

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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

14.2.1.1 Baseline Characteristics of Local Residents & Community in relation to UWF Replacement Forestry

The majority of Built Service users in the area around the UWF Replacement Forestry 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, 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.

14.2.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Local Residents & Community.

It was evaluated by the topic authors that UWF Replacement Forestry has **no potential to cause impacts to Local Residents & Community**, for the following reasons

- 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.

14.2.1.3 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry has no potential to cause impacts to Local Residents & Community by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 14.2.2 to Section 14.2.4 and included in the summary table in Section 14.2.8 in order to show the totality of the project.

14.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

14.2.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Local Residents & Community 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 14.2.2.2.1](#) below.

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 Replacement Forestry 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 \(Section A2.3.1 and Section A2.3.14\)](#).

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 Replacement Forestry 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.

14.2.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 14-3.

Table 14-3: 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.	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 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities	The extent of the study area is from the fault point to the nearest valve/transformer /cabinet.	
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

14.2.2.2.1 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 14-4.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on **Figure CE 14.2: Local Residents & Community within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 14-4: 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	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Included</u> for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	<u>Included</u> for the evaluation of cumulative effects
Element 5: UWF Other Activities	<u>Evaluated as excluded</u> : 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.

14.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character**14.2.2.3.1 Element 1: UWF Grid Connection / Element 2: UWF Related Works/ Element 4: Upperchurch Windfarm**

The majority of Built Service users in the Cumulative Evaluation 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. There are also some local community facilities in the area, particularly in Kilcommon village where the Kilcommon National School, along with some pubs, a shop, church and community hall are connected to the local built service networks.

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.

In relation to the Other Elements of the Whole UWF Project, the location of services and associated Local Residents & Community are outlined on Table 14-5 and illustrated on **Figure CE 14.2**. Further details on the individual Built Services are included in **Appendix 14.1**.

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 the town of Newport, and the villages of Rear Cross, 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 14-5: 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
UWF Grid Connection	C. 142 No. properties connected to 8 No. lengths of Irish Water Mains, 2 No. of these lengths of water mains run parallel to construction works in the road (total 200m on the L2114-0 and L6085-0), the remaining 6 No. are located at road crossing locations, where the 110kV UGC will be laid under the water main	C.200 No. properties connected to 11 No. overhead electricity lines and 3 No. underground electricity cables. These overhead lines and underground cables are generally located in fields beside the local road network.	C.185 No. properties connected to 11 No. telephone lines, these overhead lines are generally located in roadside boundaries.
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. 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.
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.

Properties located off the L-2264-50 in the Knockmaroe/Knockcurraghbola area are located in the study area for both the UWF Grid Connection and the UWF Related Works and Consent Windfarm, these properties are supplied by:

- 1 No. Irish Water main on the L2264-50 (19 No. properties),
- 1 No. overhead electricity line (27 No. properties), and
- 1 no. overhead telephone line (19 No. properties).

14.2.2.3.2 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 14.2.2.2.1

14.2.2.3.3 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.

14.2.2.4 Cumulative Information Baseline Characteristics - 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.

14.2.2.5 Cumulative Information Baseline Characteristics - 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.

14.2.2.6 Cumulative Information Baseline Characteristics - 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 upgraded³. 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.

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'.

14.2.2.7 Cumulative Information Baseline Characteristics - 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.

³ <https://www.water.ie/projects-plans/national-projects/leakage-reduction-programme/>, Pers.Comms Newport Regional Water Supply, November 2017

14.2.3 Cumulative Information: PROJECT DESIGN MEASURES for Local Residents & Community

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 UWF Related Works. 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 5.4](#) in [Volume C4: EIAR Appendices](#).

14.2.4 Cumulative Information: EVALUATION OF IMPACTS to Local Residents & Community

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Local Residents & Community**, see Section 14.2.1.

This Section evaluates the likely cumulative 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) - Local Residents & Community.

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

Table 14-6: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts <u>Included</u>	<i>Impacts <u>Excluded</u></i> (Justification in next section)
No Impacts included for Evaluation	<i>Loss of water/electricity/ communications service(s) (construction stage)</i>

The source-pathway-receptor links and the rationale for excluded impacts are described in Section 14.2.4.1.

14.2.4.1 Cumulative Information: Description and Rationale for Excluding (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from evaluation are described in Table 14-7 below.

Table 14-7: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Construction Stage				
<ul style="list-style-type: none"> 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 of electricity poles/lines	1, 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.				

14.2.5 Mitigation Measures for Impacts to Local Residents & Community

Mitigation measures are not relevant as there is **no potential for UWF Replacement Forestry to cause impacts** to Local Residents & Community.

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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Replacement Forestry (Section 14.2.1), i.e. **no potential for impacts**.

14.2.7 Application of Best Practice and the EMP for Local Residents & Community

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Local Residents & Community.

14.2.8 Summary of Impacts to Local Residents & Community

The topic authors conclude that there is no potential for UWF Replacement Forestry to cause impacts to Local Residents & Community.

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 14-8: Summary of the impacts to Local Residents & Community

Impact to Local Residents & Community:	No Impact
<i>Impact Evaluation (for Other Elements only)</i>	<i>Section 14.2.4.1</i>
<i>Project Life-Cycle Stage (for Other Elements only)</i>	All
<u>UWF Replacement Forestry</u>	No Potential for Impacts Evaluated as Excluded - see Section 14.2.1
Element 1: UWF Grid Connection	No likely impact/ Neutral impact
Element 2: UWF Related Works	No likely impact/ Neutral impact
Element 4: Upperchurch Windfarm	No likely impact/ Neutral impact
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 14.2.2.1
<u>Cumulative Impact: (Other Elements only)</u>	
All Other 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 Local Residents & Community with either the UWF Replacement Forestry 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 REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

14.3.1.1 Baseline Characteristics of Electricity Transmission System in relation to UWF Replacement Forestry

There are no transmission system assets, such as overhead 110kV or 220kV lines in the area around the UWF Replacement Forestry.

14.3.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Electricity Transmission System.

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

UWF Replacement Forestry 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 Replacement Forestry 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 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Electricity Transmission System 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 14.3.2.2.1** below.

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 Replacement Forestry 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 A2.3.14)**.

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Electricity Transmission System with UWF Replacement Forestry however in order to present the totality of the project – Bunkimalta Windfarm and Castlewaller Windfarm (both consented) have been scoped in, on a precautionary basis, for evaluation of cumulative effects relating to the Other Elements.

14.3.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 14-9.

Table 14-9: 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 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities Bunkimalta Windfarm Castlewaller Windfarm 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 Replacement Forestry.		

14.3.2.2.1 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 14-10.

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 14.3: Electricity Transmission System within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 14-10: 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	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Evaluated as excluded</u> : No potential for effects due to the absence of any Electricity Transmission System Assets in the area.
Element 4: Upperchurch Windfarm (UWF)	<u>Evaluated as excluded</u> : 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 any potential for effects have been evaluated as part of the UWF Grid Connection element
Element 5: UWF Other Activities	<u>Evaluated as excluded</u> : 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 Castlewaller Windfarm	<u>Included</u> 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 Replacement Forestry

Electricity Transmission System	14.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character	
	The <u>UWF Grid Connection</u> 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).	
Sensitive Aspect	14.3.2.3.1 Element 1: UWF Grid Connection	
	<p>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.</p> <p>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.</p> <p>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.</p>	
	14.3.2.3.2 Element 2: UWF Related Works	
	Not applicable – Element evaluated as excluded. See Section 14.3.2.2.1	
	14.3.2.3.3 Element 4: Already Consented Upperchurch Windfarm	
	Not applicable – Element evaluated as excluded. See Section 14.3.2.2.1	
	14.3.2.3.4 Element 5: UWF Other Activities	
	Not applicable – Element evaluated as excluded. See Section 14.3.2.2.1	
	14.3.2.3.5 Other Projects or Activities	
	<p>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. At present the connection point and connection date for Castlewaller Windfarm is currently unknown.</p> <p>Please Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. <u>There is no potential for cumulative effects with the UWF Replacement Forestry.</u></p>	
Material Assets (Built Services)		
Topic		

14.3.2.4 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 system⁴. 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.

14.3.2.5 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.

14.3.2.6 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.

14.3.2.7 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 Replacement Forestry 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 or 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 14-11: List of all Impacts included and excluded from the Impact Evaluation Table sections

<u>Impacts Included</u>	<u>Impacts Excluded</u> <i>(Justification in next section)</i>
No Impacts included for Evaluation	<i>Interruption of power supply on the electricity system (construction stage)</i>
	<i>Adding a control point to the Killonan to Nenagh 110kV OHL (operational stage)</i>

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 14-12 below.

Table 14-12: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Construction Stage				
Commissioning of the Mountphilips 110kV 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.
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 110kV Mountphilips Substation will add an operational control point for ESN 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.
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.				

Note: As the UWF Grid Connection is not likely to cause effects to the Electricity Transmission System, there is no potential for cumulative effects with either Bunkimalta Windfarm or Castlewaller Windfarm, should they connect to this line.

14.3.5 Mitigation Measures for Impacts to Electricity Transmission System

Mitigation measures are not relevant as there is **no potential for UWF Replacement Forestry 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 Replacement Forestry (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 Replacement Forestry 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 Replacement Forestry 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 14-13: Summary of the impacts to Electricity Transmission System

Impact to Electricity Transmission System:	No Impact
<i>Evaluation (for Other Elements only)</i>	<i>Section 14.3.4.1</i>
Project Life-Cycle Stage (for Other Elements only)	Construction/Operation
<u>UWF Replacement Forestry</u>	No Potential for Impacts Evaluated as Excluded - see Section 14.3.1
Element 1: UWF Grid Connection	No Likely Impact/ Neutral Impact
Element 2: UWF Related Works	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
<u>Cumulative Impact: (Other Element – UWF Grid Connection, only)</u>	
All Other Elements of the Whole UWF Project	No potential for Cumulative Impacts
All Elements of the Whole UWF Project <i>cumulatively with</i> Other Projects or Activities Bunkimalta Windfarm Castlewaller 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 Replacement Forestry)

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 Replacement Forestry 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.

In relation to the Electricity Transmission System, the UWF Replacement Forestry does not comprise any electrical parts and is not located near any transmission system assets.

14.6.1 Summary of UWF Replacement Forestry Impacts

- No potential for impacts to Local Residents & Community, as the planting or management of UWF Replacement Forestry will not involve the use of large machinery or deep excavations.
- No potential for UWF Replacement Forestry to cause impacts to the Electricity Transmission System, as the absence of electrical parts and interaction with the transmission system assets.

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

As UWF Replacement Forestry 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 Replacement Forestry 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.

14.6.3 Summary of the Cumulative Impacts with Other Projects or Activities

There is no potential for either UWF Replacement Forestry or the Other Elements to cause cumulative impacts to either Local Residents & Community or the Electrical Transmission System with Other Projects or Activities.

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UWF Replacement Forestry EIA Report

Volume C2: EIAR Main Report

Chapter 15: Material Assets - Roads

Topic Chapter Authors:



EIAR Coordinator:



Topic	Material Assets (Roads)
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Contents

15	Environmental Factor: Material Assets (Roads)	1
15.1	Introduction to the Material Assets (Roads) Chapter	1
15.1.1	What are Material Assets (Roads)?	1
15.1.2	Overview of Material Assets (Roads) in the Local Environment	1
15.1.3	Sensitive Aspects of the Material Assets (Roads) Environment included for further evaluation	1
15.1.4	Sensitive Aspects excluded from further evaluation	2
15.1.5	Overview of the Subject Development	2
15.1.6	The Authors of the Material Assets (Roads) Chapter	2
15.1.7	Sources of Baseline Information	3
15.1.7.1	Certainty and Sufficiency of Information Provided	3
15.1.8	Methodology for Evaluating Effects	4
15.2	Sensitive Aspect No.1: Public Roads	5
15.2.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	5
15.2.1.1	Baseline Characteristics of Public Roads in relation to UWF Replacement Forestry	5
15.2.1.2	Evaluation of UWF Replacement Forestry	5
15.2.1.3	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	5
15.2.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	6
15.2.2.1	Overview of Other Elements, Other Projects or Activities	6
15.2.2.2	Cumulative Evaluation Study Area	6
15.2.2.3	Cumulative Information: Baseline Characteristics – Context & Character	8
15.2.2.4	Cumulative Information Baseline Characteristics - Importance of Public Roads	10
15.2.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Public Roads	10
15.2.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	10
15.2.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	10
15.2.3	Cumulative Information: PROJECT DESIGN MEASURES for Public Roads	11
15.2.4	Cumulative Information: EVALUATION OF IMPACTS to Public Roads	12
15.2.4.1	Impact Evaluation Table: Damage to Road Boundaries	13
15.2.4.2	Impact Evaluation Table: Damage to Road Pavement	16
15.2.4.3	Cumulative Information: Description and Rationale for Excluding (scoped out) Impacts	19
15.2.5	Mitigation Measures for Impacts to Public Roads	21
15.2.6	Evaluation of Residual Impacts to Public Roads	21
15.2.7	Application of Best Practice and the EMP for Public Roads	21
15.2.8	Summary of Impacts to Public Roads	22

15.3 Sensitive Aspect No.2: Road Users	23
15.3.1 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	23
15.3.1.1 Baseline Characteristics of Road Users in relation to UWF Replacement Forestry	23
15.3.1.2 Evaluation of UWF Replacement Forestry	23
15.3.1.3 Cumulative Evaluation for the Other Elements (<i>grey background</i>)	23
15.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	24
15.3.2.1 Overview of Other Elements, Other Projects or Activities	24
15.3.2.2 Cumulative Evaluation Study Area	24
15.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character	25
15.3.2.4 Cumulative Information Baseline Characteristics - Importance of Road Users	27
15.3.2.5 Cumulative Information Baseline Characteristics - Sensitivity of Road Users	27
15.3.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)	27
15.3.2.7 Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends)	27
15.3.3 Cumulative Information: PROJECT DESIGN MEASURES for Road Users	28
15.3.4 Cumulative Information: EVALUATION OF IMPACTS to Road Users	29
15.3.4.1 Impact Evaluation Table: Increased Journey Times	30
15.3.4.2 Cumulative Information: Description and Rationale for Excluding (scoped out) Impacts	33
15.3.5 Mitigation Measures for Impacts to Road Users	35
15.3.6 Evaluation of Residual Impacts to Road Users	35
15.3.7 Application of Best Practice and the EMP for Road Users	35
15.3.8 Summary of Impacts to Road Users	36
15.4 Policy Context	37
15.4.1 Regional Policy	37
15.4.2 North Tipperary County Development Plan 2010 (as varied):	37
15.5 Best Practice Measures	38
15.6 Summary of the Chapter	39
15.6.1 Summary of UWF Replacement Forestry Impacts	39
15.6.2 Summary of Cumulative Impacts with Other Elements of the Whole UWF Project	39
15.6.3 Summary of Cumulative Impacts with Other Projects or Activities	39
15.7 Reference List	40

List of Figures

<u>Figure No.</u>	<u>Figure Title</u>
Figure RF 15.1	Location of the UWF Replacement Forestry
Figure CE 15.2	Public Roads within the Cumulative Evaluation Study
Figure CE 15.3	Road Users within the Cumulative Evaluation Study

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

List of Appendices

<u>Appendix No.</u>	<u>Appendix Title</u>
Appendix 15.1	Traffic & Transport Assessment Report (relates to UWF Grid Connection, UWF Related Works)
Appendix 15.2	FWD Testing (relates to UWF Grid Connection, UWF Related Works)
Appendix 15.3	Site Photographs

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

Glossary of Terms

<u>Term</u>	<u>Definition</u>
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

<u>Abbreviation</u>	<u>Full Term</u>
TII	Transport Infrastructure Ireland
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

Topic	Material Assets (Roads)
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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 comprises 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 Replacement Forestry in relation to the local road network is illustrated on OSI Mapping on **Figure RF 15.1: Location of the UWF Replacement Forestry**.

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)	<p>Evaluated as excluded, due to Neutral impacts:</p> <p>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.</p> <p>It is considered that National and Regional Road pavements or buried structures are <u>not likely</u> 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.</p>
Public Roads & Road Users along the route of any diversions temporarily put in place	<p>Evaluated as excluded, due to Neutral impacts:</p> <p>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.</p>

15.1.5 Overview of the Subject Development

The UWF Replacement Forestry is the subject development, being the subject of a current afforestation license application to the Minister for Agriculture, Food and the Marine.

Table 15-1: Subject Development –UWF Replacement Forestry

<u>Project ID</u>	<u>The Subject Development</u>	<u>Composition of the Subject Development</u>
Element 3	<u>The Subject Development</u> UWF Replacement Forestry (RF)	Replacement Forestry at Foilnaman

Note: The UWF Replacement Forestry is 'Element 3' 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 Replacement Forestry (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, 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.

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	<p>Feedback was received from</p> <ul style="list-style-type: none"> • Transport Infrastructure Ireland • Roads Department, Tipperary County Council • Members of the public during the Public Consultation and Information Day <p>See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.</p>
Guidelines	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • North Tipperary County Development Plan 2010 (as varied in 2016)., • POWSCAR 2016, CSO Database • RSA Collision Statistics Database <p>Consented Upperchurch Windfarm planning documents</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 <i>(relates to UWF Grid Connection, UWF Related Works, Upperchurch Windfarm).</i>
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) <i>(relates to UWF Grid Connection, UWF Related Works, Upperchurch Windfarm).</i>
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.

15.2 Sensitive Aspect No.1: Public Roads

This Section provides a description and evaluation of the Sensitive Aspect - Public Roads.

15.2.1 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

15.2.1.1 Baseline Characteristics of Public Roads in relation to UWF Replacement Forestry

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.

15.2.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Public Roads.

It was evaluated by the topic authors that the UWF Replacement Forestry **will not cause impacts to Public Roads**, for the following reasons:

- 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 adequate 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. This *change of use* is part of the UWF Related Works application.

15.2.1.3 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry will not cause impacts to Public Roads by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 15.2.2 to Section 15.2.4 and included in the summary table in Section 15.2.8 in order to show the totality of the project.

15.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

15.2.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Public Roads 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 15.2.2.2.1](#) below.

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 Replacement Forestry 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 Replacement Forestry 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 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 15-4.

Table 15-4: 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 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

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 15-5.

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: Public Roads within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 15-5: 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 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	<p>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.</p> <p>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.</p>

15.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

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. 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.

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 97% spare capacity during peak traffic periods.

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 Ballycahill) and the R497 at Knocknabansha (between its junction with the R503 and the junction with the L2266-11), along with the Local Roads (designated as "L" Roads); L2166-0, L2156-11, L5337-1, L2157-5, L6011-10, L51853-0, L2157-0, L6011-0, L95032-8, L21141-0, L2114-0, L6085-0, L6086-0, L6086-5, L2266-0, L6182-0, L2266-11, L2264-50, L6188-0.

Buried structures: There are 7 No. buried structures under the L2114-0 road, comprising 6 No. concrete/stone culverts routing storm water under the road at watercourse crossings W38, W39, W40, W41, W43 and W44 and 1 No. stone structure routing a small stream under the road at W42. All of these structures are located on the route of the 110kV UGC. There are an additional 4 No. buried structures along construction material haulage routes; one each on the L51853-0 at Rockvale, L6011-0 at Castlewaller, L2114-0 at Bealaclave and L6086-0 at Laghile. The buried structures in the study area were inspected during site investigations; there were no visible signs of degradation of the structures, and no cracks or depressions in the road surfaces above. It is considered that these road structures are currently in good condition and will be capable of supporting the cable trenching works and the increased traffic loading associated with the construction works.

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 96.7% spare capacity during peak traffic periods.

15.2.2.3.2 Element 2: UWF Related Works

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.

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.

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.	
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 – <u>No</u> Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 15.2.2.1.	

Public Roads

Sensitive Aspect

Material Assets (Roads)

Topic

15.2.2.4 Cumulative Information Baseline Characteristics - Importance of Public Roads

According to the Department of Transport, Tourism and Sport¹, '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.

15.2.2.5 Cumulative Information Baseline Characteristics - 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.

15.2.2.6 Cumulative Information Baseline Characteristics - 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.

15.2.2.7 Cumulative Information Baseline Characteristics - 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 2019², to allow for worst case traffic volumes during a 2018/2019 construction stage.

¹ <http://www.dttas.ie/roads/english/regional-and-local-roads>

² 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.

15.2.3 Cumulative Information: PROJECT DESIGN MEASURES for Public Roads

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 Related Works and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in [Appendices 5.3, 5.4 and 5.5](#) in [Volume C4: EIAR Appendices](#).

Public Roads

Sensitive Aspect

Material Assets (Roads)

Topic

15.2.4 Cumulative Information: EVALUATION OF IMPACTS to Public Roads

It is evaluated that UWF Replacement Forestry has no potential to cause impacts to Public Roads, see Section 15.2.1.

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) - Public Roads.

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

Table 15-6: List of all Impacts included and excluded from the Impact Evaluation Table sections

<u>Impacts Included</u> (Evaluated in the Impact Evaluation Table sections)	<u>Impacts Excluded</u> (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.

15.2.4.1 Impact Evaluation Table: Damage to Road Boundaries

Evaluation of UWF Replacement Forestry Excluded: As there is no requirement for any works to road boundaries, there is no potential for UWF Replacement Forestry to cause damage to Public Road boundaries by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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)

Construction stage

Impact Source: n/a

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 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

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 3 No. permanent site entrances and 25 No. temporary vehicular entrances (construction stage) and 6 no. operational stage entrances, along with installation of the 110kV UGC in the verge of some local roads.

A permanently widened entrance will be provided at the existing field entrance for the Mountphilips 110kV Substation, off the L2166-0, and as requested by Tipperary County Council Roads Department, permanently widened entrances will also be provided at the existing farm entrance for Temporary Compound No.2 in Bealaclave (L2114-0), and the existing farm entrance for Temporary Compound No.3 in Knockcurraghbola Commons (L6188-0). In accordance with Tii's DMRB DN-Geo-03060, sightlines of 160m will be provided according to drawing SK-004, at Temporary Compound No.1 and No.2, and Sightlines of 90m will be provided according to drawing SK-002, at Temporary Compound No.3 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 310m of roadside boundary will be permanently removed and reinstated behind sightlines.

In relation to the 25 temporary entrances off the public road along the route, (specifically the L2166-0, L2156-11, L2157-5, L6011-10, L95032-8, L21141-0, L2114-0, L6085-0, L6086-5, L2266-0, L6182-0, R497-0, L2264-50, L6188-0), 20 No. of the entrances are via existing farm or field access gates which will require some minor widening and removal of roadside boundary to facilitate the works, and 5 No. entrances will be through a new 5m wide opening in the roadside boundary.

In addition, 3 No. 5m wide sections of roadside boundary (both sides of the road) will be temporarily removed to facilitate the construction of the Cables Trench at R3, R9 and R12 on the L2157-5 and R497. In total 55m of roadside boundary will be temporarily removed.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

Public Roads	Sensitive Aspect	<ul style="list-style-type: none"> • The small number of new permanent entrances, with all 3 entrances through existing farm gates, • The reinstatement of road boundaries behind sightlines at the 3 No. permanently widened entrances, • 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 • In the context that the majority of the entrances are through existing farm access gateways, and • The reinstatement of all verges and roadside drainage following the completion of construction works in an area.
		Element 2: UWF Related Works
		<p><u>Impact Magnitude:</u> No works to road boundaries are required for Realigned Windfarm Roads, Telecoms Relay Pole or UWF Related Works Ancillary Works.</p> <p>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.</p> <p>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.</p>
		<u>Significance of the Impact:</u> Imperceptible
Material Assets (Roads)	Topic	<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 4: Consented Upperchurch Windfarm
		<p><u>Impact Magnitude:</u> 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.</p>
		<u>Significance of the Impact:</u> Not be Significant
Material Assets (Roads)	Topic	<p><u>Rationale for Impact Evaluation:</u> 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.</p>
		Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 15.2.2.2.1
		Evaluation of Cumulative Impacts – Damage to Road Boundaries
		All Elements of the Whole UWF Project
Material Assets (Roads)	Topic	<p><u>Cumulative Impact Magnitude:</u></p> <p>The roadside boundaries affected by the UWF Grid Connection works are for the most part on local roads, which are located away from UWF Related Works or Upperchurch Windfarm traffic. There is only one road – the L2264-50 which will be subject to works and traffic relating to all three elements, the UWF Grid Connection will require the opening of a new temporary entrance at R13, the UWF Related Works in road widening works along the L2264-50 and Internal Windfarm Cable crossing at the RW6, and there are 2 site entrances from this road for the Upperchurch Windfarm.</p>
		<u>Significance of the Cumulative Impact:</u> Imperceptible

Rationale for Cumulative Impact Evaluation:

- The boundaries associated with UWF Grid Connection works, are for the most part located away from UWF Related Works.
- The small number of temporary entrances (3 No.), which will be affected by more than one element,
- The location of all of these 3 No. entrances through existing farm entrances or field gateways
- The very small extent of boundary removal at these entrances, and
- The reinstatement of these roadside boundaries following the completion of construction works.

Public Roads

Sensitive Aspect

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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 15.2.2.1).

Material Assets (Roads)

Topic

15.2.4.2 Impact Evaluation Table: Damage to Road Pavement

Evaluation of UWF Replacement Forestry Excluded: As there is no requirement for any works to road pavements, there is no potential for UWF Replacement Forestry to cause damage to Public Road pavements by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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)

Construction stage

Impact Source: n/a

Cumulative Impact Source: Trenching works, site access, construction/delivery traffic

Impact Pathway: road boundary

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

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

Element 1: UWF Grid Connection

Impact Magnitude: In total, 1,700m of the 110kV UGC is routed across or along the following roads: L-2166-0, L2156-11, L2157-5, L6011-10, L95032-8, L21141-0, L2114-0, L6085-0, L6086-5, L2266-0, L6182-0, L2264-50, and R497. These works will involve the excavation of a trench c.1.25m deep and 0.6m wide in the public road pavement (assuming a worst-case scenario that the cables will not be installed in any of the roadside verges). Small sections of verge will be removed and overlaid with hardcore at the 25 No. temporary site access points for the UWF Grid Connection works.

As per Appendix 15.1: Traffic and Transport Assessment Report, the additional construction traffic associated with the UWF Grid Connection on the above listed roads along with the local roads on the delivery routes (L51853-0, L2157-0, L6011-0, L2266-11 and L6188-0), will have a negligible effect on the network capacity and operation of the roads within the study area, as in excess of 96.7%, 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

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 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.

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 Cumulative Impacts – Damage to Road Pavements

All Elements of the Whole UWF Project

Cumulative Impact Magnitude: The road pavements affected by the UWF Grid Connection works are for the most part on local roads, which are 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 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.

Public Roads	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • The good condition but weak pavement strength of most 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 or more.
	<p>Note: No cumulative evaluation of <u>Other Projects or Activities</u> is included in the table above, because <u>no</u> Other Projects or Activities were evaluated as having potential to cause cumulative effects to Public Roads with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 15.2.2.1).</p>

Material Assets (Roads)
Topic

15.2.4.3 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 15-7 below.

Table 15-7: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Construction Stage				
Trenching works, site access, construction traffic	1, 2	Road	Damage road culverts	<p>Rationale for Excluding: no likely impact</p> <p>UWF Grid Connection – no likely impact: The 7 No. buried structures, all located on the L-2114-0, along the route of the 110kV UGC are currently in good condition and are not subject to vehicular weight restrictions. Furthermore, each of these structures have been assessed by TLI Group and it has been found that there is sufficient depth of cover in which to install the underground cables without risk to the 6 No. culverts, therefore no impact is expected to these culverts. In relation to the stone arch bridge at W42, which is also located on the L2114-0, the cables will be installed in flat formation over the stone arch bridge. There are an additional 4 No. buried structures along haulage routes – one each on the L51853-0 at Rockvale, the L6011-0 at Castlewallar, the L2114-0 at Bealaclave and the L6086-0 at Laghile. These structures were visually inspected by engineers from TLI Group in 2017 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.</p> <p>There are no works at public road structures associated with the Upperchurch Windfarm.</p> <p>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.</p>
Operational Stage				

Public Roads

Sensitive Aspect

Material Assets (Roads)

Topic

		<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Public Roads	Sensitive Aspect	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 38 No. 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 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 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. There will be no requirement for road works, or works to buried structures or works to roadside boundaries to carry out any maintenance works, therefore no effects to Public Roads are expected. 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.				
Material Assets (Roads)						
Topic						

15.2.5 Mitigation Measures for Impacts to Public Roads

Mitigation measures are not relevant as **no impacts** are likely to occur to Public Roads as a consequence of the UWF Replacement Forestry.

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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Replacement Forestry (Section 15.2.1), i.e. **no impacts**.

15.2.7 Application of Best Practice and the EMP for Public Roads

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Public Roads.

15.2.8 Summary of Impacts to Public Roads

The topic authors conclude that UWF Replacement Forestry will not cause impacts to Public Roads.

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 15-8: Summary of the impacts to Public Roads

Impact to Public Roads:	Damage to Road Boundaries	Damage to Road Pavements
<i>Evaluation Impact Table (for Other Elements only)</i>	<i>Section 15.2.4.1</i>	<i>Section 15.2.4.2</i>
Project Life-Cycle Stage <i>(for Other Elements only)</i>	Construction	Construction
<u>UWF Replacement Forestry</u>	No Impacts Evaluated as Excluded - see Section 15.2.1	
Element 1: UWF Grid Connection	Imperceptible	Imperceptible
Element 2: UWF Related Works	Imperceptible	Imperceptible
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	
<u>Cumulative Impact:</u> <i>(for Other Elements only)</i>		
All Other Elements of the Whole UWF Project	Imperceptible	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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 15.2.2.1).

Public Roads

Sensitive Aspect

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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

15.3.1.1 Baseline Characteristics of Road Users in relation to UWF Replacement Forestry

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.

15.3.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Road Users.

It was evaluated by the topic authors that **no impacts to Road Users are likely to occur** due to the development of the UWF Replacement Forestry, for the following reasons:

- 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.

15.3.1.3 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry will not cause impacts to Road Users by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 15.3.2 to Section 15.3.4 and included in the summary table in Section 15.3.8 in order to show the totality of the project.

15.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

15.3.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Road Users 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 15.3.2.2.1](#) below.

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 Replacement Forestry 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 Replacement Forestry 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 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is Table 15-9.

Table 15-9: 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 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

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 15-10.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on [Figure CE 15.3: Road Users within the Cumulative Evaluation Study Area](#) (Volume C3 EIAR Figures).

Table 15-10: 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 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	<p>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.</p> <p>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.</p>

Road Users

Sensitive Aspect

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 roads in the area (R503 and R497) 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.

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

Material Assets (Roads)

Topic

Road Users	Sensitive Aspect	<p>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. See Appendix 15.1 for more details on safety statistics.</p> <p>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.</p>
		<p>15.3.2.3.1 Element 1: UWF Grid Connection</p> <p>The roads which could be potentially affected by the UWF Grid Connection works and associated haulage are the <u>Regional Roads</u> R503 (between Newport and Ballycahill) and the R497 at Knocknabansha (between its junction with the R503 and the junction with the L2266-11), along with the <u>Local Roads</u> (designated as "L" Roads); L2166-0, L2156-11, L5337-1, L2157-5, L6011-10, L51853-0, L2157-0, L6011-0, L95032-8, L21141-0, L2114-0, L6085-0, L6086-0, L6086-5, L2266-0, L6182-0, L2266-11, L2264-50, L6188-0.</p> <p>Traffic count surveys were carried out for a 24-hour period at 18. 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: Traffic and Transport Assessment Report.</p> <p>The waymarked walking routes that exist in the study area consist of the Slievefelim Way and Kilcommon Pilgrim Loop. 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 GC 15.3: Road Users within the UWF Grid Connection Study Area. Figure GC 15.3 is part of the EIA Report for the UWF Grid Connection, and is included in Volume E: Reference Documents with this planning application. 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; sections of the Kilcommon Pilgrim Route are along the L6086-5 and L2266-0; and all of the Ormond Way Cycle route is along public roads.</p>
Material Assets (Roads)	Topic	<p>15.3.2.3.2 Element 2: UWF Related Works</p> <p>The roads which could be potentially affected by the UWF Related Works and associated haulage are the <u>Regional Road</u> R503 (between Newport and Ballycahill) along with the <u>Local Roads</u> (designated as "L" Roads); L6185-13, L2264-50, L6188-0, L61881-0, L2264-34, L4139-16, L4138-12 and L4139-0.</p> <p>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 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.</p> <p>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). 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. Part of the Ormond Way walking route (currently under development) is along the L4139-0; the entire Ormond Way Cycle route is along public roads.</p>

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.	
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 – <u>No</u> Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 15.3.2.1.	
15.3.2.4 Cumulative Information Baseline Characteristics - 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).	
15.3.2.5 Cumulative Information Baseline Characteristics - 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.	
15.3.2.6 Cumulative Information Baseline Characteristics - 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.	
15.3.2.7 Cumulative Information Baseline Characteristics - 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.	

Road Users

Sensitive Aspect

Material Assets (Roads)

Topic

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.

Road Users
Sensitive Aspect

15.3.3 Cumulative Information: PROJECT DESIGN MEASURES for Road Users

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 Related Works and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in [Appendices 5.3, 5.4 and 5.5](#) in [Volume C4: EIAR Appendices](#).

Material Assets (Roads)
Topic

15.3.4 Cumulative Information: EVALUATION OF IMPACTS to Road Users

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Road Users**, see Section 15.3.1.

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) - Road Users.

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

Table 15-11: List of all Impacts included and excluded from the Impact Evaluation Table sections

<u>Impacts Included</u> (Evaluated in the Impact Evaluation Table sections)	<u>Impacts Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
Increased Journey Times (construction stage)	<i>Increased Risk of Road Accidents (construction stage)</i>
	<i>Interrupted or disrupted access to property (construction stage)</i>

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.

15.3.4.1 Impact Evaluation Table: Increased Journey Times

Evaluation of UWF Replacement Forestry Excluded: As there are no requirement for roads and extremely low volumes of traffic associated with the UWF Replacement Forestry there is no potential for UWF Replacement Forestry to cause increase journey times of Road Users by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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) Construction stage

Impact Source: n/a

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

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

Element 1: UWF Grid Connection

Impact Magnitude: The UWF Grid Connection requires 13 separate cable crossing of public roads, 10 No. of which will all be completed within one day. At Oakhampton, 170m of trenching along the public road L2156-11 will be completed within 3 days, c.940 trips were recorded within a 24-hour period during 2017 traffic counts. At Bealaclave, 1280m of trenching along the public road L2114-0 will be completed within 20 days c.166 trips were recorded within a 24-hour period during 2017 traffic counts. 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.

At Baurnadomeeny, 150m of trenching along the public road L6085-0, will require a road closure, for part of the day (between 9:30am and 1:30pm), over a 4-day period. To facilitate the 7 No. local residents on this road, the works will take place during school holidays, and the 7 No. local residents will be consulted regarding the timing of the road closure. An alternative route is available to these local residents.

As 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 96.7%, on average, of the capacity of the majority of the affected roads will remain available during the construction stage.

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, and trenching along the length of a public road not lasting more than 4 weeks,
- 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

Material Assets (Roads)

Topic

Element 2: UWF Related Works
<p>Impact Magnitude: The Internal Windfarm Cabling requires 9 No. separate cable crossing of public roads, which will all be completed within one day.</p> <p>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.</p>
<p>Significance of the Impact: Imperceptible</p>
<p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> • 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 4: Consented Upperchurch Windfarm
<p>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 98.9%, on average, of the capacity of the majority of the affected roads will remain available during the construction stage.</p>
<p>Significance of the Impact: not be significant</p>
<p>Rationale for Impact Evaluation:</p> <ul style="list-style-type: none"> • 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
Evaluation of Cumulative Impacts – Increased Journey Times
All Elements of the Whole UWF Project
<p>Cumulative Impact Magnitude: The whole windfarm works requires road works on lightly trafficked sections at 34. No. locations on roads within the study area with 1 location overlapped between these elements – L2264-50 (relating to 110kV UGC trenching and Internal Windfarm Cabling Trenching and Haul Route Works). 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 a doubling of traffic on the L6188-0 and L4139-0 (from c.65 to c.125, and c.35 to 65, respectively) vehicles per day. Notwithstanding the doubling the traffic volumes, over 98% of the capacity of the road will remain available on these roads.</p> <p>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%, on average, of the capacity of each of the majority of the affected roads will remain available during the construction stage.</p>

Road Users	<p>Significance of the Cumulative Impact: ranging from Imperceptible to Slight:</p> <p>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.</p>
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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, and trenching along the length of a public road not lasting more than 4 weeks at any location, • The temporary duration of increased traffic associated with the delivery of construction materials; • Application of traffic management measures and use of flagmen
Sensitive Aspect	<p>Note: No cumulative evaluation of <u>Other Projects or Activities</u> is included in the table above, because <u>no</u> Other Projects or Activities were evaluated as having potential to cause cumulative effects to Road Users with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 15.3.2.1).</p>

Material Assets (Roads)
Topic

15.3.4.2 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 15-12 below.

Table 15-12: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
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 4 weeks) 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	Road	Interrupted or disrupted access to property	Rationale for Excluding: Neutral impact to road users: Roadworks will take place at 13 no. locations for the UWF Grid Connection, and 18 No. locations for the UWF Related Works. Only one road work location (UWF Grid Connection crossing R8 on the L-6085-0) will require a road closure for 4 No. days (between 9:30am and 1:30pm, and during school holidays only, as agreed with the 7 no. local residents) and an alternative route is available at this location, therefore it is considered that in the context of agreed closure times with local residents, the availability of alternative route, and the very low number of local road users affected, that neutral impacts relating to interrupted or disrupted access to property will occur.. It has been agreed with the 7 No. local residents on this road that the road will not be closed until after the morning peak period, and will open again before the evening peak period, and works will be carried out during school holidays. The road closures and timing of works will be managed during the works under the Traffic Management Plan which will be overseen by an Environmental Clerk of Works, who will also be the dedicated point of contact for local residents. There are no road works associated with Element 4 Upperchurch Windfarm.
Operational Stage				
Rationale for Excluding: Neutral Impacts or No Impacts:				

Road Users

Sensitive Aspect

Material Assets (Roads)

Topic

Source(s) of Impacts		Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Road Users	With regard to the <u>UWF Grid Connection</u> : The Mountphilips Substation, will be remotely monitored and secured, and will be inspected on a monthly basis. Each of the 38 No. 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 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 and there will be no requirement for road works, no impacts to Road Users are expected.				
	With regard to the <u>UWF Related Works</u> : 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 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 <u>Upperchurch Windfarm</u> : 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.				
Sensitive Aspect	Decommissioning Stage				
	Rationale for Excluding: Neutral Impacts/No Impacts.				
	The <u>UWF Grid Connection</u> will not be decommissioned, therefore there is no potential for effects.				
Material Assets (Roads)	The traffic volumes associated with those parts of the <u>UWF Related Works</u> 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 <u>Upperchurch Windfarm</u> , 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.				
Topic					

15.3.5 Mitigation Measures for Impacts to Road Users

Mitigation measures are not relevant as **impacts to Road Users will be Neutral** as a consequence of the UWF Replacement Forestry.

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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Replacement Forestry (Section 15.3.1), i.e. **neutral impacts**.

15.3.7 Application of Best Practice and the EMP for Road Users

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Road Users.

Road Users

Sensitive Aspect

Material Assets (Roads)

Topic

15.3.8 Summary of Impacts to Road Users

The topic authors conclude that impacts to Road Users as a consequence of the UWF Replacement Forestry will be neutral.

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 15-13: Summary of the impacts to Road Users

Impact to Road Users:	No Impact
<i>Evaluation Impact Table (for Other Elements only)</i>	<i>Section 15.3.4.1</i>
Project Life-Cycle Stage (for Other Elements only)	Construction
<u>UWF Replacement Forestry</u>	Neutral Impacts Evaluated as Excluded - see Section 15.3.1
Element 1: UWF Grid Connection	Imperceptible
Element 2: UWF Related Works	Imperceptible
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
<u>Cumulative Impact:</u> (for Other Elements only)	
All Other Elements of the Whole UWF Project	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 Road Users with either the UWF Replacement Forestry 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](#).

15.5 Best Practice Measures

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Material Assets (Roads).

15.6 Summary of the Chapter

Access to UWF Replacement Forestry is from the **Local Road** L2264-34, through an existing farm entrance. The existing sightlines and size of this entrance are adequate for the UWF Replacement Forestry activities and no widening or other works are required.

Sensitive Aspects evaluated in this topic chapter include Public Roads and Road Users.

The main volume of traffic associated with UWF Replacement Forestry will occur during its planting stage, however traffic volumes will be extremely low, and less than the typical traffic from a dwelling house. Traffic volumes will be even less during the growth stage, and as the new native woodland will be permanent woodland and will not be harvested – no harvesting traffic will occur.

15.6.1 Summary of UWF Replacement Forestry Impacts

- Impacts to Public Roads or Road Users will be neutral.

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

As UWF Replacement Forestry 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 UWF Grid Connection, UWF Related Works and Upperchurch Windfarm).

- UWF Replacement Forestry will not cause cumulative effects with Other Elements,
- Cumulative impacts to Public Roads and Road Users, as a consequence of the Other Elements of the Whole UWF Project, will range from cumulatively Imperceptible to Slight.

15.6.3 Summary of Cumulative Impacts with Other Projects or Activities

There is no potential for cumulative effects with Other Projects or Activities.

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UWF Replacement Forestry EIA Report

Volume C2: EIAR Main Report

Chapter 16: Cultural Heritage

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Topic	Cultural Heritage
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Contents

16	Environmental Factor: Cultural Heritage	1
16.1	Introduction to the Cultural Heritage Chapter.....	1
16.1.1	What is Cultural Heritage?	1
16.1.2	Overview of Cultural Heritage in the Local Environment.....	1
16.1.3	Sensitive Aspects of the Cultural Heritage Environment included for further evaluation.....	2
16.1.4	Sensitive Aspects excluded from further evaluation.....	2
16.1.5	Overview of the Subject Development	2
16.1.6	The Authors of the Cultural Heritage Chapter	3
16.1.7	Sources of Baseline Information	3
16.1.7.1	Certainty and Sufficiency of Information Provided	4
16.1.8	Methodology for Evaluating Effects	5
16.2	Sensitive Aspect No.1: Recorded Legally Protected Sites	7
16.2.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	7
16.2.1.1	Baseline Characteristics of Recorded Legally Protected Sites in relation to UWF Replacement Forestry.....	7
16.2.1.2	Evaluation of UWF Replacement Forestry	7
16.2.1.3	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	7
16.2.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	8
16.2.2.1	Overview of Other Elements, Other Projects or Activities.....	8
16.2.2.2	Cumulative Evaluation Study Area	8
16.2.2.3	Cumulative Information: Baseline Characteristics – Context & Character	10
16.2.2.4	Cumulative Information Baseline Characteristics - Importance of Recorded Legally Protected Sites	11
16.2.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Recorded Legally Protected Sites	11
16.2.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario).....	11
16.2.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends).....	11
16.2.3	Cumulative Information: PROJECT DESIGN MEASURES for Recorded Legally Protected Sites.....	12
16.2.4	Cumulative Information: EVALUATION OF IMPACTS to Recorded Legally Protected Sites	13
16.2.4.1	Impact Evaluation Table: Visual Impact	14
16.2.4.2	Cumulative Information: Description and Rationale for Excluded (scoped out) Impacts.....	17
16.2.5	Mitigation Measures for Impacts to Recorded Legally Protected Sites	18
16.2.6	Evaluation of Residual Impacts to Recorded Legally Protected Sites	18
16.2.7	Application of Best Practice and the EMP for Recorded Legally Protected Sites.....	18

16.2.8	Summary of Impacts to Recorded Legally Protected Sites.....	19
16.3	Sensitive Aspect No.2: Other Recorded Sites	21
16.3.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	21
16.3.1.1	Baseline Characteristics of Other Recorded Sites in relation to UWF Replacement Forestry	21
16.3.1.2	Evaluation of UWF Replacement Forestry	21
16.3.1.3	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	21
16.3.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	22
16.3.2.1	Overview of Other Elements, Other Projects or Activities	22
16.3.2.2	Cumulative Evaluation Study Area	22
16.3.2.3	Cumulative Information: Baseline Characteristics – Context & Character	23
16.3.2.4	Cumulative Information Baseline Characteristics - Importance of Other Recorded Sites	24
16.3.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Other Recorded Sites	24
16.3.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario).....	25
16.3.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends).....	25
16.3.3	Cumulative Information: PROJECT DESIGN MEASURES for Other Recorded Sites	26
16.3.4	Cumulative Information: EVALUATION OF IMPACTS to Other Recorded Sites.....	27
16.3.4.1	Cumulative Information: Description and Rationale for Excluding (scoped out) Impacts	28
16.3.5	Mitigation Measures for Impacts to Other Recorded Sites.....	30
16.3.6	Evaluation of Residual Impacts to Other Recorded Sites	30
16.3.7	Application of Best Practice and the EMP for Other Recorded Sites	30
16.3.8	Summary of Impacts to Other Recorded Sites	31
16.4	Sensitive Aspect No.3: Previously Unrecorded Sites	33
16.4.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	33
16.4.1.1	Baseline Characteristics of Previously Unrecorded Sites in relation to UWF Replacement Forestry.....	33
16.4.1.2	Evaluation of UWF Replacement Forestry	33
16.4.1.3	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	33
16.4.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	34
16.4.2.1	Overview of Other Elements, Other Projects or Activities	34
16.4.2.2	Cumulative Evaluation Study Area	34
16.4.2.3	Cumulative Information: Baseline Characteristics – Context & Character	35
16.4.2.4	Cumulative Information Baseline Characteristics - Importance of Previously Unrecorded Sites .	36
16.4.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Previously Unrecorded Sites ...	36
16.4.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario).....	37

16.4.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends).....	37
16.4.3	Cumulative Information: PROJECT DESIGN MEASURES for Previously Unrecorded Sites	38
16.4.4	Cumulative Information: EVALUATION OF IMPACTS to Previously Unrecorded Sites.....	39
16.4.4.1	Impact Evaluation Table: Damage to townland boundaries	40
16.4.4.2	Cumulative Information: Description and Rationale for Excluding (scoped out) Impacts	43
16.4.5	Mitigation Measures for Impacts to Previously Unrecorded Sites	44
16.4.6	Evaluation of Residual Impacts to Previously Unrecorded Sites	44
16.4.7	Application of Best Practice and the EMP for Previously Unrecorded Sites	44
16.4.8	Summary of Impacts to Previously Unrecorded Sites	45
16.5	Sensitive Aspect No.4: Unrecorded Subsurface Sites	47
16.5.1	UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED	47
16.5.1.1	Baseline Characteristics of Unrecorded Subsurface Sites in relation to UWF Replacement Forestry.....	47
16.5.1.2	Evaluation of UWF Replacement Forestry	47
16.5.1.3	Cumulative Evaluation for the Other Elements (<i>grey background</i>)	47
16.5.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	48
16.5.2.1	Overview of Other Elements, Other Projects or Activities.....	48
16.5.2.2	Cumulative Evaluation Study Area	48
16.5.2.3	Cumulative Information: Baseline Characteristics – Context & Character	49
16.5.2.4	Cumulative Information Baseline Characteristics - Importance of Unrecorded Subsurface Sites	50
16.5.2.5	Cumulative Information Baseline Characteristics - Sensitivity of Unrecorded Subsurface Sites	50
16.5.2.6	Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the ‘Do-Nothing’ scenario).....	50
16.5.2.7	Cumulative Information Baseline Characteristics - Receiving Environment (the Baseline + Trends).....	50
16.5.3	Cumulative Information: PROJECT DESIGN MEASURES for Unrecorded Subsurface Sites	51
16.5.4	Cumulative Information: EVALUATION OF IMPACTS to Unrecorded Subsurface Sites	52
16.5.4.1	Impact Evaluation Table: Complete or partial destruction	53
16.5.4.2	Cumulative Information: Description and Rationale for Excluding (scoped out) Impacts	55
16.5.5	Mitigation Measures for Impacts to Unrecorded Subsurface Sites	56
16.5.6	Evaluation of Residual Impacts to Unrecorded Subsurface Sites.....	56
16.5.7	Application of Best Practice and the EMP for Unrecorded Subsurface Sites.....	56
16.5.8	Summary of Impacts to Unrecorded Subsurface Sites.....	57
16.6	Policy Context	59
16.6.1	National Policy.....	59
16.6.2	Regional Policy.....	59

16.6.3	North Tipperary County Development Plan 2010 (as varied):	59
16.7	Best Practice Measures	60
16.8	Summary of the Cultural Heritage Chapter	61
16.8.1	Summary of UWF Replacement Forestry Impacts	61
16.8.2	Summary of Cumulative Impacts to Cultural Heritage with the Other Elements of the Whole UWF Project	61
16.8.3	Summary of the Cumulative Impacts with Other Projects or Activities.....	62
16.9	Reference List	63

List of Figures

<u>Figure No.</u>	<u>Figure Title</u>
Figure RF 16.1	Location of the UWF Replacement Forestry on Historical Mapping
Figure CE 16.2	Recorded Legally Protected Sites within the Cumulative Evaluation Study Area
Figure CE 16.3	Other Recorded Sites within the Cumulative Evaluation Study Area
Figure CE 16.4	Previously Unrecorded Sites within the Cumulative Evaluation Study Area
Figure CE 16.5	Unrecorded Subsurface Sites within the Cumulative Evaluation Study Area

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

List of Appendices

<u>Appendix No.</u>	<u>Appendix Title</u>
Appendix 16.1	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 (Castlewaller) A16.1.4 - Test Excavation Report (Knockmaroe) A16.1.5 - Test Excavation Report (Knockcurraghbola Common) A16.1.6 - Field Walking Description.	

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

Glossary of Terms

<u>Term</u>	<u>Definition</u>
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

<u>Abbreviation</u>	<u>Full Term</u>
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
UGC	Underground Cables
UWF	Upperchurch Windfarm

Topic	Cultural Heritage
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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, or 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, and historic structures 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.

16.1.2 Overview of Cultural Heritage in the Local Environment

The UWF Replacement Forestry 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. Within the broader upland landscape monuments recorded on the Record of Monuments and Places 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 16.1: Detailed Cultural Heritage Desktop and Fieldwork Survey Results](#).

The location of the UWF Replacement Forestry is illustrated on OSI Mapping on [Figure RF 16.1: Location of the UWF Replacement Forestry 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 Replacement Forestry is the subject development, being the subject of a current afforestation license application to the Minister for Agriculture, Food and the Marine.

Table 16-1: Subject Development –UWF Replacement Forestry

<u>Project ID</u>	<u>The Subject Development</u>	<u>Composition of the Subject Development</u>
Element 3	<u>The Subject Development</u> UWF Replacement Forestry (RF)	Replacement Forestry at Foilnahan

Note: The UWF Replacement Forestry is 'Element 3' 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 Replacement Forestry (Volume C2 EIA 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 C  il  n O'Drisceoil (MA MIAI) of Kilkenny Archaeology. The report authors are members of the Irish Archaeological Institute, 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	<p>Feedback was received from</p> <ul style="list-style-type: none"> Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs – Developments Application Unit. <p>See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.</p>
Guidelines	<ul style="list-style-type: none"> '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 (<i>Valetta Convention</i>, ratified by Ireland 1997) The European Convention on the Protection of the Architectural Heritage (<i>Granada Convention</i>, 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	<ul style="list-style-type: none"> 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 <p><i>Maps</i></p> <ul style="list-style-type: none"> First edition 1840 Ordnance Survey map sheet Second edition 1900 Ordnance Survey map sheet Griffith's Valuation maps and valuation report

Type	Source
	<ul style="list-style-type: none"> Records of Monuments and Places (RMP) constraints maps <i>Aerial photographs</i> 2000 Ordnance Survey orthophotography 2005 Ordnance Survey orthophotography Google Earth Bing maps aerial photos <div>Consented Upperchurch Windfarm planning documents</div> <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Field survey, walking of the works areas Test excavations within the zone of notification for recorded monuments; Site 86 - Wedge Tomb (16E0261) and Site 52 - Ringfort (16E0262) 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

<u>Quality of Impacts</u>	<u>Description</u>
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

<u>Significance of Impacts</u>	<u>Description</u>
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.

Introduction, Authors, Sources, Methodology

Topic Cultural Heritage

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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

16.2.1.1 Baseline Characteristics of Recorded Legally Protected Sites in relation to UWF Replacement Forestry

UWF Replacement Forestry will be planted on agricultural lands in Foilnahan townland, in the Slievefelim to Silvermine Mountains upland area in County Tipperary.

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 area in the context of the Slievefelim to Silvermine Mountain uplands is provided in [Appendix 16.1: Detailed Cultural Heritage Desktop and Fieldwork Survey Results](#) (Volume C4: EIAR Appendices).

16.2.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Recorded Legally Protected Sites.

It was evaluated by the topic authors that **UWF Replacement Forestry is not likely to cause impacts to Recorded Legally Protected Sites**, for the following reasons:

- 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.

16.2.1.3 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry has no potential to cause impacts to Recorded Legally Protected Sites by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 16.2.2 to Section 16.2.4 and included in the summary table in Section 16.2.8 in order to show the totality of the project.

16.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics**16.2.2.1 Overview of Other Elements, Other Projects or Activities**

The evaluation of cumulative impacts to Recorded Legally Protected Sites considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at **Appendices 5.3, 5.4, 5.5 and 5.6, in Volume C4 EIAR Appendices**. Scoping of these Other Elements is presented in **Section 16.2.2.2.1** below.

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 Replacement Forestry 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: no other projects or activities will cause cumulative effects to Recorded Legally Protected Sites with UWF Replacement Forestry however in order to present the totality of the project – Milestone Windfarm, Foilnaman Mast, Cummermore Communications Pole have been scoped in for evaluation of cumulative effects relating to the Other Elements.

16.2.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 16-5.

Table 16-5: 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	Cumulative Construction Stage Impacts; footprint of the construction works area plus 500m radius surrounding the footprint of the construction works areas,	Cumulative impacts to Cultural Heritage Sites is limited to those sites which could potentially be affected by both the UWF Replacement Forestry 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.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Project or Activity: Milestone Windfarm Foilnaman Mast Cummermore Communications Pole	Cumulative Operational Stage Visual Impacts: 2km zone around the location of the Telecoms Relay Pole	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 – i.e. visual effects beyond 2km will be Neutral.
	Cumulative Construction Stage Impacts; footprint of the construction works area plus 500m radius surrounding the footprint of the construction works areas.	Cumulative impacts to Cultural Heritage Sites is limited to those sites which could potentially be affected by both the Whole UWF Project and by Other Projects or Activities. Visual impact: Regarding the consented Upperchurch Windfarm, any cumulative visual

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
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 Replacement Forestry.	Cumulative Operational Stage Visual Impacts: 4km from the Mountphilips Substation and from the Telecoms Relay Pole	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 E: Reference Documents

Recorded Legally Protected Sites

Sensitive Aspect

16.2.2.2.1 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 16-6.

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 16.2: Recorded Legally Protected Sites within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 16-6: 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 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No 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 Foilnahan Mast Cummermore Communications Pole	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 Replacement Forestry.

Cultural Heritage

Topic

Recorded Legally Protected Sites	16.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character	
	16.2.2.3.1	Element 1: UWF Grid Connection
Sensitive Aspect	<p>Within the combined¹ UWF Grid Connection Study Areas, there are a total of 46 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.</p> <p>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 46 sites can be broken down by project element as follows; 1 Ballaun Stone, 2 Barrows, 1 Boulder Burial, 1 Bawn, 1 Cairn, 1 Castle - Tower House, 2 Children's Burial Ground, 4 Churches, 3 Graveyards, 2 Cists, 1 Cliff- Edge Fort, 1 Earthwork, 1 Font, 1 Enclosure, 1 Fulacht Fiadh, 1 House, 6 Wedge Tombs, 11 Ringforts, 2 Ritual Sites - Holy Wells, 2 Standing Stones and a Stone Row.</p> <p>The UWF Grid Connection construction works areas occur within the zone of notification of two of these sites: <i>Site 86 – Wedge Tomb</i> (c.20m east of the 110kV UGC route) and <i>Site 52 - Ringfort</i> (35m north of the 110kV UGC route). Archaeological testing was carried out at both of these sites; the test reports are included as Appendix 16.1.</p> <p>In relation to the Operational Stage, there are 4 No. sites which will have theoretical visibility of the Mountphilips Substation; <i>Site 7 - Ringfort</i>, <i>Site 8 - Bawn</i>, <i>Site 9 - Castle - Tower House</i>, and <i>Site 31 - Bowl Barrow</i>. See Figure GC 16.2. Figure GC 16.2 is included in the UWF Grid Connection EIA Report (2018) in Volume E: Reference Documents</p>	
	16.2.2.3.2	Element 2: UWF Related Works
Cultural Heritage	<p>Within the combined² 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.</p> <p>The UWF Related Works construction works area occurs within the zone of notification of one of these sites; <i>Site 83 - Stone Row</i> (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.</p> <p>In relation to the Operational Stage, there are 7 No. sites which will have theoretical visibility of the Telecoms Relay Pole Site 82 - Wedge Tomb, Site 83 - Stone Row, Site 84 - Fulacht Fiadh, Site 85 - Megalithic Tomb, Site 97 - Ring Barrow, Site 98 - Ring Barrow and Site 99 - Cist. See Figure RW 16.2. Figure RW 16.2 is included in the UWF Related Works EIA Report (2018) in Volume E: Reference Documents</p>	
	16.2.2.3.3	Element 4: Already Consented Upperchurch Windfarm
Topic	<p>The sites within 500m of the UWF are included in the description for the UWF Related Works above.</p> <p>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.</p> <p>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 <u>and</u> the UWF Related Works <u>and</u> the Upperchurch Windfarm; Site 82 - Wedge Tomb, Site 83 - Stone Row, Site 84 - Fulacht Fia, Site 85 - Megalithic Tomb, Site 86 - Wedge Tomb.</p>	

¹ for construction stage and operational stage effects

² for construction stage and operational stage effects

16.2.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 16.2.2.2.1

16.2.2.3.5 Other Projects or Activities

Milestone Windfarm is currently under construction and will comprise 6 no. wind turbines, part of the UWF Grid Connection is routed through one of the landholdings associated with Milestone Windfarm. The Milestone turbines 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.

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 Replacement Forestry.

16.2.2.4 Cumulative Information Baseline Characteristics - Importance of Recorded Legally Protected Sites

Sites listed on the Record of Monuments and Places are protected under the National Monuments Acts (1934-2014). None of the sites identified are classed as National Monuments.

16.2.2.5 Cumulative Information Baseline Characteristics - 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.

16.2.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)

Increased legal protections offered to Recorded Protected Sites under the National Monuments Acts 1930-2014 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.

16.2.2.7 Cumulative Information Baseline Characteristics - 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.

16.2.3 Cumulative Information: PROJECT DESIGN MEASURES for Recorded Legally Protected Sites

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

Recorded Legally Protected Sites

Sensitive Aspect

Cultural Heritage

Topic

16.2.4 Cumulative Information: EVALUATION OF IMPACTS to Recorded Legally Protected Sites

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Recorded Legally Protected Sites**, see Section 16.2.1.

This Section evaluates the likely cumulative effects of the Other Elements of the Whole UWF Project and of 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) - Recorded Legally Protected Sites.

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

Table 16-7: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
Visual Impact (operational stage)	<i>Complete or partial destruction (construction stage)</i>
	<i>Decommissioning Effects</i>

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.

16.2.4.1 Impact Evaluation Table: Visual Impact

Evaluation of UWF Replacement Forestry Excluded: As there are no Recorded Legally Protected Sites within 500m of the afforestation lands, the impact of UWF Replacement Forestry to Recorded Legally Protected Sites will not be greater than Neutral by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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: 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

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**, (Site 7 - Ringfort, Site 8 - Bawn, Site 9 - Castle - Tower House, and Site 31 - 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 2: UWF Related Works

Impact Magnitude: There are 7 No. sites which will have theoretical visibility of the Telecoms Relay Pole; Site 82 - Wedge Tomb, Site 83 - Stone Row, Site 84 - Fulacht Fiadh, Site 85 - Megalithic Tomb, Site 97 - Ring Barrow, Site 98 - Ring Barrow and Site 99 - 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 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

<ul style="list-style-type: none"> • In the context of other, more noticeable, structures in the vicinity which include telecommunication masts and wind turbines. 	Recorded Legally Protected Sites
Element 4: Consented Upperchurch Windfarm	
<u>Impact Magnitude:</u> 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	
<u>Significance of the Impact:</u> Not Significant	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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. 	Sensitive Aspect
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 (Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. <u>There is no potential for cumulative effects with the UWF Replacement Forestry.</u>)	
Other Project: Milestone Windfarm	
<u>Impact Magnitude:</u> 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.	
<u>Significance of the Impact:</u> Not significant	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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: Foilnahan Mast	
<u>Impact Magnitude:</u> 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.	
<u>Significance of the Impact:</u> Imperceptible	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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	
<u>Impact Magnitude:</u> 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.	
<u>Significance of the Impact:</u> Imperceptible	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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. 	

Recorded Legally Protected Sites

Sensitive Aspect

Cultural Heritage

Topic

Recorded Legally Protected Sites	Evaluation of Cumulative Impacts – Visual Impact	
	All Elements of the Whole UWF Project	
Sensitive Aspect	<p><u>Cumulative Impact Magnitude:</u></p> <p>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.</p> <p>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.</p>	
	Significance of the Cumulative Impact: No Cumulative Impact	
	<p><u>Rationale</u> for Cumulative Impact Evaluation:</p> <ul style="list-style-type: none"> • 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 	
	All Elements of the Whole UWF Project with Other Projects or Activities	
	<p><u>Cumulative Impact Magnitude:</u></p> <p>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 Foilnahan Mast or Cummermore Communications Pole.</p> <p>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.</p> <p>It is also considered that due to their small scale, any views of the Telecoms Relay Pole together with the other existing communication structures cumulatively Neutral.</p>	
	Significance of the Cumulative Impact: Imperceptible	
	<p><u>Rationale</u> for Cumulative Impact Evaluation:</p> <ul style="list-style-type: none"> • 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 Foilnahan 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). 	
Cultural Heritage		
Topic		

16.2.4.2 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 16-8 below.

Table 16-8: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway(s)</u>	<u>Impacts (Consequence)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Construction Stage				
Ground-works	1, 2, 4	Mechanical or manual excavation of soil.	Complete or partial struction	<p>Rationale for Excluding:</p> <p>In relation to the <u>UWF Grid Connection</u> and the <u>UWF Related Works</u>: 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 2 No. sites near <u>UWF Grid Connection</u> construction works areas - <i>Site 52 - Ringfort</i> in Castle Waller and <i>Site 86 – Wedge Tomb</i> in Knockmaroe, and 1 No. site near the <u>UWF Related Works</u> - <i>Site 83 – Stone Row</i> in Knockcurraghbola Commons. Test excavations at these three sites encountered no features or objects of archaeological significance.</p> <p>In relation to the <u>Upperchurch Windfarm</u>, 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.</p> <p>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 National Monuments Service and the National Museum of Ireland, to monitor groundworks and stop works 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 correctly recorded and/or preserved, in consultation with the National Monuments Service and the National Museum of Ireland.</p>
Decommissioning Stage				
Rationale for Excluding: No potential for impacts, there are no new ground works required for decommissioning.				

Recorded Legally Protected Sites	16.2.5 Mitigation Measures for Impacts to Recorded Legally Protected Sites <p>Mitigation measures are not relevant as UWF Replacement Forestry is not likely to cause impacts to Recorded Legally Protected Sites.</p>
	16.2.6 Evaluation of Residual Impacts to Recorded Legally Protected Sites <p>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 Replacement Forestry (Section 16.2.1), i.e. no likely impacts.</p>
Sensitive Aspect	16.2.7 Application of Best Practice and the EMP for Recorded Legally Protected Sites <p>No UWF Replacement Forestry Best Practice Measures have been developed specifically for Recorded Legally Protected Sites.</p>
Cultural Heritage	
Topic	

16.2.8 Summary of Impacts to Recorded Legally Protected Sites

The topic authors conclude that UWF Replacement Forestry is not likely to cause impacts to Recorded Legally Protected 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 16-9: Summary of the impacts to Recorded Legally Protected Sites

Impact to Recorded Legally Protected Sites:	Visual Impact
<i>Evaluation Impact Table (for Other Elements only)</i>	<i>Section 16.2.4.1</i>
<i>Project Life-Cycle Stage (for Other Elements only)</i>	<i>Operational Stage</i>
<u>UWF Replacement Forestry Impact</u>	No Potential for Impacts Evaluated as Excluded - see Section 16.2.1
Element 1: UWF Grid Connection	No Impact
Element 2: UWF Related Works	Imperceptible
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	No Cumulative Impact
All Elements of the Whole UWF Project <i>cumulatively with</i> Other Projects or Activities Milestone Windfarm Foilnahan Mast Cummermore Communications Pole	Imperceptible

(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 Replacement Forestry).

Recorded Legally Protected Sites
Sensitive Aspect

Topic
Cultural Heritage

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 REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

16.3.1.1 Baseline Characteristics of Other Recorded Sites in relation to UWF Replacement Forestry

Other Recorded Sites relate to sites recorded on the National Inventory of Architectural Heritage. 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 Replacement Forestry.

16.3.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Other Recorded Sites.

It was evaluated by the topic authors that UWF Replacement Forestry has no potential to cause impacts to **Other Recorded Sites**, for the following reasons

- 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.

16.3.1.3 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry 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 Replacement Forestry 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 Overview of Other Elements, Other Projects or Activities**

The evaluation of cumulative impacts to Other Recorded Sites considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at [Appendices 5.3, 5.4, 5.5 and 5.6](#), in [Volume C4 EIAR Appendices](#). Scoping of these Other Elements is presented in [Section 16.3.2.2.1](#) below.

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 Replacement Forestry 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 Replacement Forestry 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.

16.3.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 16-10.

Table 16-10: Cumulative Evaluation Study Area for Other Recorded Sites

Table 20: Cumulative Evaluation Study Area for Other Recorded Sites		
Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	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 Replacement Forestry 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 visual effects will be Neutral.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

16.3.2.2.1 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 16-11.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on **Figure CE 16.3: Other Recorded Sites within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 16-11: 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 2: UWF Related Works	Evaluated as excluded: No potential for effects due to: 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
Element 4: Upperchurch Windfarm (UWF)	Evaluated as excluded: No potential for effects due to As per the 2013 EIS, there 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.

16.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

16.3.2.3.1 Element 1: UWF Grid Connection

There are 11 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 *Site 11 – House, Site 25 – House, Site 41 – School, Site 74 – Church, and Site 75 – Curates House*; and the remaining 6 No. sites are demesnes listed on the NIAH Garden Survey – *Site 10 – Cragg Demesne, Site 13 – Mount Philips Demesne, Site 24 – Barna Demesne, Site 26 – Oakhampton Demesne, Site 37 – Fort Emil Demesne and Site 58 – Castlewaller Demesne*. The construction works area is routed through both *Site 13 – Mount Philips Demesne* and *Site 26 – Oakhampton Demesne*. See **Figure GC 16.3: Other Recorded Sites within the UWF Grid Connection Study Area**. Figure GC 16.3 is included in the UWF Grid Connection EIA Report (2018) in **Volume E: Reference Documents**

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 - *Site 10 – Cragg Demesne, Site 11 – House, Site 13 – Mount Philips Demesne, Site 24 – Barna Demesne, Site 25 – House, Site 26 –*

Other Recorded Sites	<p><i>Oakhampton Demesne, Site 37 - Fort Emil Demesne, and Site 41 – School.</i> See Figure GC 16.3. Figure GC 16.3 is included in the UWF Grid Connection EIA Report (2018) in Volume E: Reference Documents with this planning application.</p> <p>Further details on the Other Recorded Sites within the study area are included in Appendix 16.1: Detailed Cultural Heritage Desktop and Fieldwork Survey Results (Volume C4: EIAR Appendices).</p> <p>A detailed description of the topography and landuse along the various sections, recorded during field walking, is provided in Appendix 16.1.</p> <p>The majority of sites on the NIAH date from the 18th and 19th century and form part an important part of the regions built heritage. <i>Site 25 - House</i> forms part of Oakhampton Demesne. <i>Site 74 - Church</i> and <i>Site 75 - Curates House</i> form part of Kilcommon Village. <i>Site 11 - House</i> and <i>Site 41 - School</i> are isolated in rural settings.</p> <p>The six 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.</p> <p>Specifically in relation to the Mount Philips Demesne and the Castle Waller Demesne, in whose areas the construction works will take place, <i>Site 13 - Mount Philips Demesne</i> is described on the survey as having virtually no recognisable features visible while <i>Site 26 - Oakhampton Demesne</i> is described as having the main features substantially present but the peripheral features being unrecognisable. During field walking it was noted that both of these sites have been subsumed into the modern agricultural landscape common to western extent of the UWF Grid Connection study area.</p> <p>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.</p>	
	<p>16.3.2.3.2 Element 2: UWF Related Works</p> <p>Not applicable – Element evaluated as excluded. See Section 16.3.2.2.1</p>	
Sensitive Aspect	<p>16.3.2.3.3 Element 4: Already Consented Upperchurch Windfarm</p> <p>Not applicable – Element evaluated as excluded. See Section 16.3.2.2.1</p>	
	<p>16.3.2.3.4 Element 5: UWF Other Activities</p> <p>Not applicable – Element evaluated as excluded. See Section 16.3.2.2.1</p>	
Cultural Heritage	<p>16.3.2.3.5 Other Projects or Activities</p> <p>Not applicable – <u>No</u> Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 16.3.2.1.</p>	
	<p>16.3.2.4 Cumulative Information Baseline Characteristics - Importance of Other Recorded Sites</p> <p>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.</p>	
Topic	<p>16.3.2.5 Cumulative Information Baseline Characteristics - Sensitivity of Other Recorded Sites</p> <p>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</p>	

design. In instances where these landscapes might survive, the views may be affected by new structures, which may potentially visually impact these sites.

16.3.2.6 Cumulative Information Baseline Characteristics - Trends in the Baseline Environment (the 'Do-Nothing' scenario)

There are five 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 six 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.

16.3.2.7 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.

Other Recorded Sites

Sensitive Aspect

Cultural Heritage

Topic

Other Recorded Sites
Sensitive Aspect

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](#).

Cultural Heritage
Topic

16.3.4 Cumulative Information: EVALUATION OF IMPACTS to Other Recorded Sites

It is evaluated that **UWF Replacement Forestry 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.

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 16-12: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
No Impacts Included for Evaluation	<i>Complete or partial destruction (construction stage)</i>
	<i>Visual Impact (operational stage)</i>
	<i>Decommissioning stage</i>

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 16-13 below.

Table 16-13: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
Construction Stage				
Ground-works	1	Mechanical or manual excavation of soil.	Complete or partial destruction	<p>Rationale for Excluding: No potential for impacts/No likely impacts,</p> <p>In relation to the UWF Grid Connection, a total of 11 No. Other Recorded Sites were identified within the study area, 9 No. of these sites are located some distance outside the boundary of the construction works and there is no potential for impacts to occur.</p> <p>Works will be carried out within the area of 2 No. sites, each of which is a designed landscape recorded on the NIAH Garden Survey - <i>Site 13</i> - Mount Philips Demesne and <i>Site 26</i> - Oakhampton Demesne. In relation to these two sites; Site 13 - Mount Philips is described on the survey as having virtually no recognisable features visible while Oakhampton is described as having the main features substantially present but the peripheral features being unrecognisable. During field walking it was noted that of these sites have been subsumed into the modern agricultural landscape in the area. Therefore, it is considered that there is no potential for impacts to these two sites.</p> <p>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 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 archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to monitor groundworks and stop works 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 correctly recorded and/or preserved, in consultation with the National Monuments Service and the National Museum of Ireland.</p>
Operational Stage				
Above-ground structures	1	Visibility	Visual Impact	<p>Rationale for Excluding: No potential for impact</p> <p>In relation to the UWF Grid Connection, only the Mountphilips Substation (up to 8m in height, with</p>

Other Recorded Sites

Sensitive Aspect

Cultural Heritage

Topic

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
				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- <i>Site 10 - Cragg Demesne, Site 11 – House, Site 13 - Mount Philips Demesne, Site 24 – Barna Demesne, Site 25 - House, Site 26 - Oakhampton Demesne, Site 37 - Fort Emil Demesne, and Site 41 – School</i> . 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; <i>Site 13 – Mount Philips Demesne</i> 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.				

Other Recorded Sites

Sensitive Aspect

Cultural Heritage

Topic

16.3.5 Mitigation Measures for Impacts to Other Recorded Sites

Mitigation measures are not relevant as there is **no potential for UWF Replacement Forestry 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 Replacement Forestry (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 Replacement Forestry 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 Replacement Forestry 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 16-14: Summary of the impacts to Other Recorded Sites

Impact to Other Recorded Sites:	No impact
<i>Evaluation Impact Table (for Other Elements only)</i>	<i>Section 16.3.4.1</i>
<i>Project Life-Cycle Stage (for Other Elements only)</i>	<i>All</i>
<u>UWF Replacement Forestry Impact</u>	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 2: UWF Related Works	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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 16.3.2.1).

Other Recorded Sites
Sensitive Aspect

Cultural Heritage
Topic

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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

16.4.1.1 Baseline Characteristics of Previously Unrecorded Sites in relation to UWF Replacement Forestry

Previously Unrecorded Sites in this 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, which may not have ever had any structural elements associated with them or are no longer standing.

UWF Replacement Forestry is located in the townland of Foilnaman. The townland boundary of Foilnaman with Knockcurraghbola Commons townland forms part of the boundary of the UWF Replacement Forestry lands. There are 3 Previously Unrecorded Sites (2 wells and a quarry) which will have theoretical visibility of the new woodland.

16.4.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Previously Unrecorded Sites.

It was evaluated by the topic authors that UWF Replacement Forestry has no potential to cause impacts to **Previously Unrecorded Sites**, for the following reasons

- 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 visual effects caused by the maturing wood will be Neutral.

16.4.1.3 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry will not cause impacts to Previously Unrecorded Sites by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 16.4.2 to Section 16.4.4 and included in the summary table in Section 16.4.8 in order to show the totality of the project.

16.4.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

16.4.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Previously Unrecorded Sites considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at [Appendices 5.3, 5.4, 5.5 and 5.6](#), in [Volume C4 EIAR Appendices](#). Scoping of these Other Elements is presented in [Section 16.4.2.2.1](#) below.

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 Replacement Forestry 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 Replacement Forestry 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.

16.4.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is as described in Table 16-15.

Table 16-15: Cumulative Evaluation Study Area for Previously Unrecorded Sites

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	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 Replacement Forestry and by Other Elements of the Whole UWF Project.
Element 2: UWF Related Works		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.
Element 4: Upperchurch Windfarm (UWF)		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.
Element 5: UWF Other Activities		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 visual effects will be Neutral.
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

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 16-16.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on **Figure CE 16.4: Previously Unrecorded Sites within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 16-16: 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 2: UWF Related Works	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: 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

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, which may not have ever had any structural elements associated with them or are no longer standing.

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 16.1**.

It should be noted that 18 No. Previously Unrecorded Sites are located within the study area associated with the UWF Grid Connection and the UWF Related Works and the 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

Cartographic analysis, aerial photography and a thorough field survey identified a total of 209 No. Previously Unrecorded Sites were identified within the total UWF Grid Connection Study Area.

While these were all mapped over the course of this report, only 25 No. Previously Unrecorded Sites, which were deemed to have potential significance, were numbered, listed and described in detail in the complete table of sites, which can be found in **Appendix 16.1: Detailed Desktop and Fieldwork Survey Results**. These comprise of Site 6 - Smithy, Site 12 - Pond, Site 14 - House, Site 15 - Ford, Site 16 - Bridge, Site 17- House, Site 18 - Stepping Stones, Site 19 - Demesne, Site 20 House, Site 21 - Lodge, Site 22 - House, Site 23 Lodge, Site 28 Stepping Stones, Site 32 - House, Site 34 - Mill, Site 35 - Bridge, Site 38 - House, Site 39 - Demesne, Site 40 - School, Site 42 - Demesne, Site 59 - "Culley Rock", Site 61 - Ford, Site 62 - "Old Course", Site 63 - Ford and Site 71 Footbridge. See **Figure GC 16.4: Previously Unrecorded Sites within the UWF Grid Connection**

Previously Unrecorded Sites	Sensitive Aspect	<p>Study Area. Figure GC 16.4 is included in the UWF Grid Connection EIA Report (2018) in Volume E: Reference Documents</p> <p>In relation to the Operational Stage, there are 74 No. sites which will have theoretical visibility of the Mountphilips Substation; 22 No. of these are lime kilns, 6 No. are gravel pits/quarries, 19 No. are springs/wells and 2 No. are points where the UWF Grid Connection crosses townland boundaries. 25 No. of these sites are numbered and listed on the table of sites in Appendix 16.1.</p>
		<p>16.4.2.3.2 Element 2: UWF Related Works</p> <p>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.</p> <p>While these were all mapped over the course of this report, only 1 No. Previously Unrecorded Sites (Site 100, 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 16.1: Detailed Desktop and Fieldwork Survey Results.</p> <p>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 (Site 100).</p>
		<p>16.4.2.3.3 Element 4: Already Consented Upperchurch Windfarm</p> <p>The 41 No. Previously Unrecorded Sites, identified for the UWF Related Works are also relevant to the <u>Upperchurch Windfarm</u> construction works areas and the Consented UWF Turbines.</p>
		<p>16.4.2.3.4 Element 5: UWF Other Activities</p> <p>Not applicable – Element evaluated as excluded. See Section 16.4.2.2.1</p>
		<p>16.4.2.3.5 Other Projects or Activities</p> <p>Not applicable – <u>No</u> Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 16.4.2.1.</p>
Cultural Heritage	Topic	<p>16.4.2.4 Cumulative Information Baseline Characteristics - Importance of Previously Unrecorded Sites</p> <p>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 are indicative of the long history of human activity within the study area.</p>
		<p>16.4.2.5 Cumulative Information Baseline Characteristics - Sensitivity of Previously Unrecorded Sites</p> <p>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. An exception to this may relate to previously unrecorded demesne, house or lodge sites and also "Culley Rock" (Site 59) at the peak of an upland area in Castlewaller Townland. These would only be sensitive in instances where the historic fabric is still largely intact and there are clear sightlines with said aboveground structures.</p>

16.4.2.6 Cumulative Information Baseline Characteristics - 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.

16.4.2.7 Cumulative Information Baseline Characteristics - 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.

16.4.3 Cumulative Information: PROJECT DESIGN MEASURES for Previously Unrecorded Sites

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 UWF Related Works and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in [Appendices 5.3, 5.4 and 5.5](#) in [Volume C4: EIA Appendices](#).

Previously Unrecorded Sites

Sensitive Aspect

Cultural Heritage

Topic

16.4.4 Cumulative Information: EVALUATION OF IMPACTS to Previously Unrecorded Sites

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Previously Unrecorded Sites**, see Section 16.4.1.

This Section evaluates the likely cumulative 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) - Previously Unrecorded Sites.

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

Table 16-17: 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)	<i>Complete or partial destruction on other Previously Unrecorded Sites (i.e. not townlands) (construction stage)</i>
	<i>Visual Impact (operational stage)</i>
	<i>Decommissioning Effects</i>

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.

16.4.4.1 Impact Evaluation Table: Damage to townland boundaries

Evaluation of UWF Replacement Forestry Excluded: As no works will be carried to the Foilnaman/Knockcurraghbola Commons townland boundary which occurs within the UWF Replacement Forestry site, there is no potential for UWF Replacement Forestry to cause damage to Previously Unrecorded Sites (townland boundaries) by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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)

Construction stage

Impact Source: n/a

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

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 c.255m of boundary at 13 No. townland boundaries along the route of the 110kV UGC. 5 no. of these boundaries are through existing farm/forestry gateways, and 8 no. are new boundary crossing points. The new boundary crossing points will be affected by the temporary removal of short sections of boundary, in order to provide temporary site access points. However, on the Coole/Freagh townland boundary a 180m section will be temporarily removed to provide sightlines at the public road site entrance E1.

2 No. townland boundaries will be affected by the permanent removal of short sections 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 E1.

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 in most cases) of the total extent of any particular townland boundary is to be affected by the UWF Grid Connection.

Previously Unrecorded Sites

Sensitive Aspect

Cultural Heritage

Topic

- 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

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 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

Previously Unrecorded Sites

Sensitive Aspect

Cultural Heritage

Topic

Previously Unrecorded Sites	Evaluation of Cumulative Impacts – Damage to Townland Boundaries	
	All Elements of the Whole UWF Project	
Sensitive Aspect	<p>Cumulative Impact Magnitude: A total of 305m of boundary will be temporary removed at 23 No. townland boundaries (5m of which overlap at 2 No. boundaries between the UWF Grid Connection and the UWF Related Works) 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.</p>	
	<p>Significance of the Cumulative Impact: Slight</p> <p>Rationale for Cumulative Impact Evaluation:</p> <ul style="list-style-type: none"> • 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 <i>in situ</i> or <i>by record</i>, 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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 16.4.2.1).

16.4.4.2 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 16-18 below.

Table 16-18: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway(s)</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
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)	<p>Rationale for Excluding:</p> <p>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 event of any archaeological features or objects being uncovered during excavation works, and will ensure that any features or objects uncovered will be correctly recorded and preserved, in consultation with the National Monuments Service and the National Museum of Ireland.</p>
Operational Stage				
Above-ground structures	1, 2, 4	Visibility	Visual Impact	<p>Rationale for Excluding:</p> <p>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 61 No. sites which would have <u>theoretical</u> 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.</p> <p>In relation to the <u>UWF Related Works</u> - only the Telecoms Relay Pole has the potential to cause visual effects and 19 No. Previously Unrecorded Sites have <u>theoretical</u> 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.</p>
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 are not relevant as **UWF Replacement Forestry will not cause impacts** to Previously Unrecorded Sites.

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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Replacement Forestry (Section 16.4.1), i.e. **no impacts**.

16.4.7 Application of Best Practice and the EMP for Previously Unrecorded Sites

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Previously Unrecorded Sites.

16.4.8 Summary of Impacts to Previously Unrecorded Sites

The topic authors conclude that there is no potential for UWF Replacement Forestry to cause impacts to Previously Unrecorded 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 16-19: Summary of the impacts to Previously Unrecorded Sites

Impact to Previously Unrecorded Sites:	Damage to townland boundaries
<i>Evaluation Impact Table (for Other Elements only)</i>	<i>Section 16.4.4.1</i>
<i>Project Life-Cycle Stage (for Other Elements only)</i>	<i>Construction Stage</i>
<u>UWF Replacement Forestry Impact</u>	No Potential for Impacts Evaluated as Excluded - see Section 16.4.1
Element 1: UWF Grid Connection	Slight
Element 2: UWF Related Works	Slight
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

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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 16.4.2.1).

Previously Unrecorded Sites
Sensitive Aspect

Cultural Heritage
Topic

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 UWF REPLACEMENT FORESTRY – EVALUATED AS EXCLUDED

16.5.1.1 Baseline Characteristics of Unrecorded Subsurface Sites in relation to UWF Replacement Forestry

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 upland area has been subject to intensive agriculture and later forestry planting, it is considered that Unrecorded Subsurface Sites in the upland area 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.

16.5.1.2 Evaluation of UWF Replacement Forestry

UWF Replacement Forestry was evaluated for its potential to cause impacts to Unrecorded Subsurface Sites. It was evaluated by the topic authors that **no impacts to Unrecorded Subsurface Sites are likely to occur** due to the development of the UWF Replacement Forestry, for the following reasons:

- 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 no 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 be likely to be small artefacts, levelled earthworks or backfilled cuts. These types of archaeology are considered unlikely to be sensitive to visual effects.

16.5.1.3 Cumulative Evaluation for the Other Elements

(grey background)

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

UWF Replacement Forestry is not likely to cause impacts to Unrecorded Subsurface Sites by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because UWF Replacement Forestry 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 16.5.2 to Section 16.5.4 and included in the summary table in Section 16.5.8 in order to show the totality of the project.

16.5.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

16.5.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Unrecorded Subsurface Sites considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at [Appendices 5.3, 5.4, 5.5 and 5.6](#), in [Volume C4 EIAR Appendices](#). Scoping of these Other Elements is presented in [Section 16.5.2.2.1](#) below.

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 Replacement Forestry 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 Replacement Forestry 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.

16.5.2.2 Cumulative Evaluation Study Area

The study area for the evaluation of cumulative effects is described in Table 16-20.

Table 16-20: 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 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

16.5.2.2.1 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 16-21.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on [Figure CE 16.5: Unrecorded Subsurface Sites within the Cumulative Evaluation Study Area](#) (Volume C3 EIAR Figures).

Table 16-21: 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 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No 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.

16.5.2.3 Cumulative Information: Baseline Characteristics – Context & Character

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 16.1: Detailed Cultural Heritage Desktop and Fieldwork Survey Results](#) (Volume C4 EIAR Appendices).

16.5.2.3.1 Element 1: UWF Grid Connection

Because of the increased likelihood of Unrecorded Subsurface Sites in the vicinity of known archaeological monuments, archaeological test excavations were carried out at 2 No. locations along the UWF Grid Connection construction works areas, where the construction works area passes through the Zone of Notification for *Site 52 - Ringfort (16E0262)* in Castle Waller and *Site 86 – Wedge Tomb* in Knockmaroe (16E0261). Nothing of archaeological significance was encountered during these test excavations. The test excavation reports are included in [Appendix 16.1](#).

16.5.2.3.2 Element 2: UWF Related Works

Because of the increased likelihood of Unrecorded Subsurface Sites in the vicinity of known archaeological monuments, archaeological test excavations were carried out 1 No. location along the UWF Related Works construction works areas where construction works will pass within the Zone of Notification for *Site 83 – Stone Row (17E173)* in Knockcurraghbola Commons. Nothing of archaeological significance was encountered during these test excavations. The test excavation reports are included in [Appendix 16.1](#).

Unrecorded Subsurface Sites	16.5.2.3.3	Element 4: Already Consented Upperchurch Windfarm
	The consented Upperchurch Windfarm is not located within close proximity to any known archaeological monuments.	
	16.5.2.3.4	Element 5: UWF Other Activities
	Not applicable – Element evaluated as excluded. See Section 16.5.2.2.1	
	16.5.2.3.5	Other Projects or Activities
Sensitive Aspect	Not applicable – <u>No</u> Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 16.5.2.1.	
	16.5.2.4 Cumulative Information Baseline Characteristics - Importance of Unrecorded Subsurface Sites	
	Subsurface features or structures of archaeological significance are subject to protection under the National Monuments Acts (1934-2014).	
	16.5.2.5 Cumulative Information Baseline Characteristics - 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.	
	16.5.2.6 Cumulative Information Baseline Characteristics - 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.	
	16.5.2.7 Cumulative Information Baseline Characteristics - 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.	

Cultural Heritage
Topic

16.5.3 Cumulative Information: PROJECT DESIGN MEASURES for Unrecorded Subsurface Sites

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 Related Works 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](#).

Unrecorded Subsurface Sites

Sensitive Aspect

Cultural Heritage

Topic

16.5.4 Cumulative Information: EVALUATION OF IMPACTS to Unrecorded Subsurface Sites

It is evaluated that **UWF Replacement Forestry has no potential to cause impacts to Unrecorded Subsurface Sites**, see Section 16.5.1.

This Section evaluates the likely cumulative 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) - Unrecorded Subsurface Sites.

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

Table 16-22: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
Complete or partial destruction (construction stage)	<i>Visual Impact (operational stage)</i>
	<i>Decommissioning Stage Effects</i>

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.

16.5.4.1 Impact Evaluation Table: Complete or partial destruction

Evaluation of UWF Replacement Forestry Excluded: As planting works will involve manual turning of the sod using spades, and will be carried out on improved agricultural lands, it is unlikely that the UWF Replacement Forestry will cause damage to Unrecorded Subsurface Sites by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Replacement Forestry 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)	Construction stage
Impact Source: n/a	
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	
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. 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 <i>in situ</i> or <i>by record</i> , any structures, features or objects of archaeological significance which may be encountered during the works.	
Significance of the Impact: Slight	
Rationale for Impact Evaluation:	
<ul style="list-style-type: none"> • 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 initial groundworks by an on-site archaeologist, under license. 	
Element 2: UWF Related Works	
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	

Unrecorded Subsurface Sites	by the UWF Grid Connection works, particularly given the high number of Cultural Heritage Sites in close proximity. 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 <i>in situ</i> or <i>by record</i> , any structures, features or objects of archaeological significance which may be encountered during the works.
	<u>Significance of the Impact:</u> Slight
Sensitive Aspect	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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 4: Consented Upperchurch Windfarm
	<u>Impact Magnitude:</u> 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.
	<u>Significance of the Impact:</u> Slight
	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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 Cumulative Impacts – Complete or partial destruction
	All Elements of the Whole UWF Project
	<u>Cumulative Impact Magnitude</u> 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.
Cultural Heritage	<u>Significance of the Cumulative Impact:</u> No Cumulative Impact
	<u>Rationale for Cumulative Impact Evaluation:</u> <ul style="list-style-type: none"> • Previously unknown sites can only be impacted upon by initial groundworks and not by subsequent groundworks.
Topic	Note: No cumulative evaluation of <u>Other Projects or Activities</u> is included in the table above, because <u>no</u> Other Projects or Activities were evaluated as having potential to cause cumulative effects to Unrecorded Subsurface Sites with either the UWF Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 16.5.2.1).

16.5.4.2 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 16-23 below.

Table 16-23: 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

<u>Source(s) of Impacts</u>	<u>Project Element</u>	<u>Pathway(s)</u>	<u>Impacts (Consequences)</u>	<u>Rationale for Excluding (Scoping Out)</u>
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 <u>unlikely</u> 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 are not relevant as **the UWF Replacement Forestry is not likely to cause impacts** to Unrecorded Subsurface Sites.

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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Replacement Forestry (Section 16.5.1), i.e. **no likely impacts**.

16.5.7 Application of Best Practice and the EMP for Unrecorded Subsurface Sites

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Unrecorded Subsurface Sites.

16.5.8 Summary of Impacts to Unrecorded Subsurface Sites

The topic authors conclude that there is no potential for UWF Replacement Forestry to cause impacts to Unrecorded Subsurface 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 16-24: Summary of the impacts to Unrecorded Subsurface Sites

Impact to Unrecorded Subsurface Sites:	Complete or partial destruction
<i>Evaluation Impact Table (for Other Elements only)</i>	<i>Section 16.5.4.1</i>
<i>Project Life-Cycle Stage (for Other Elements only)</i>	<i>Construction</i>
<u>UWF Replacement Forestry Impact</u>	No Potential for Impacts Evaluated as Excluded - see Section 16.5.1
Element 1: UWF Grid Connection	Slight
Element 2: UWF Related Works	Slight
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

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 Replacement Forestry or the Other Elements of the Whole UWF Project (see Section 16.5.2.1).

Unrecorded Subsurface Sites
Sensitive Aspect

Topic
Cultural Heritage

16.6 Policy Context

16.6.1 National Policy

Archaeological heritage is protected under the National Monuments Acts, 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.'*

16.7 Best Practice Measures

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Cultural Heritage.

16.8 Summary of the Cultural Heritage Chapter

UWF Replacement Forestry is located in the eastern extent 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).

There are no Recorded Legally Protected Sites or Other Recorded Sites either within or in close proximity to the UWF Replacement Forestry lands.

UWF Replacement Forestry is located in the townland of Foilnaman. The townland boundary of Foilnaman with Knockcurraghbola Commons townland forms part of the boundary of the UWF Replacement Forestry lands. Within the wider area, there are 3 Previously Unrecorded Sites (2 wells and a quarry) which will have theoretical visibility of the new woodland.

UWF Replacement Forestry was evaluated for potential to damage cultural heritage sites during initial groundworks in the planting stage. The maturing woodland was also evaluated for potential to cause visual impacts during its lifetime.

16.8.1 Summary of UWF Replacement Forestry Impacts

- There is no potential for effects to Recorded Legally Protected Sites or Other Recorded Sites,
- As the new woodland will be planted by hand using spades, with no works required to townland boundaries, it is considered that impacts to Previously Unrecorded Sites or Unrecorded Subsurface Sites are not likely to occur,
- UWF Replacement Forestry is not expected to cause visual impacts to any Sensitive Aspect of Cultural Heritage.

16.8.2 Summary of Cumulative Impacts to Cultural Heritage with the Other Elements of the Whole UWF Project

As UWF Replacement Forestry 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 and above ground structures associated with the Other Elements).

- There is no potential for UWF Replacement Forestry to cause cumulative effects,
- Cumulative effects with the Other Elements are limited to Previously Unrecorded Sites, where 2 townland boundaries will be effected by both the UWF Grid Connection and UWF Related Works, 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 Other Elements, the cumulative visual impact to Recorded Legally Protected Sites caused by the Telecom Relay Pole (UWF Related Works) cumulatively with the Consented UWF Turbines, is considered Not Significant.

16.8.3 Summary of the Cumulative Impacts with Other Projects or Activities

There is no potential for UWF Replacement Forestry 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 Related Works together with Other Projects (Milestone Windfarm, Foilnahan Mast and Cummermore Communications Pole).

- Cumulative effects to Recorded Legally Protected Sites or Previously Unrecorded Sites will be no greater than Slight Adverse as a consequence of the UWF Replacement Forestry cumulatively with Other Projects or Activities.
- There is no potential for cumulative effects with Other Recorded Sites or Unrecorded Subsurface Sites.

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UWF Replacement Forestry EIA Report

Volume C2: EIAR Main Report

Chapter 17: Landscape

Topic Chapter Authors:



EIAR Coordinator:



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Topic	Landscape
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Contents

17	Environmental Factor: Landscape	1
17.1	Introduction to the Landscape Chapter	1
17.1.1	What is Landscape?	1
17.1.2	Overview of Landscape in the Local Environment	1
17.1.3	Sensitive Aspects of the Landscape Environment included for further evaluation	1
17.1.4	Sensitive Aspects excluded from further evaluation.....	1
17.1.5	Overview of the Subject Development	2
17.1.6	The Authors of the Landscape Chapter	2
17.1.7	Sources of Baseline Information	2
17.1.7.1	Certainty and Sufficiency of Information Provided	3
17.1.8	Methodology for Evaluating Effects	4
17.1.8.1	Landscape Evaluation Criteria	4
17.1.8.2	Visual Impact Criteria	6
17.1.8.3	Significance of Landscape and Visual Impacts.....	7
17.2	Sensitive Aspect No.1: Landscape Character	9
17.2.1	BASELINE CHARACTERISTICS of Landscape Character	9
17.2.1.1	STUDY AREA for Landscape Character	9
17.2.1.2	Baseline Context and Character of Landscape Character in the UWF Replacement Forestry Study Area	9
17.2.1.3	Importance of Landscape Character	9
17.2.1.4	Sensitivity of Landscape Character.....	9
17.2.1.5	Trends in the Baseline Environment (the 'Do-Nothing' scenario).....	10
17.2.1.6	Receiving Environment (the Baseline + Trends).....	10
17.2.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	11
17.2.2.1	Overview of Other Elements, Other Projects or Activities	11
17.2.2.2	Cumulative Evaluation Study Area	12
17.2.2.3	Cumulative Information: Baseline Characteristics – Context & Character	14
17.2.2.4	Cumulative Information Baseline Characteristics - Sensitivity of Landscape Character	15
17.2.3	PROJECT DESIGN MEASURES for Landscape Character	16
17.2.4	EVALUATION OF IMPACTS to Landscape Character	17
17.2.4.1	Impact Evaluation Table: Alteration or division of land cover and vegetation patterns	18
17.2.4.2	Impact Evaluation Table: Intensification of activity causing a reduction in rural tranquillity.....	21
17.2.4.3	Impact Evaluation Table: Intensification of built development and reduction in the integrity of rural landscape patterns	25
17.2.4.4	Description and Rationale for Excluded (scoped out) Impacts	29

17.2.5	Mitigation Measures for Impacts to Landscape Character	30
17.2.6	Evaluation of Residual Impacts to Landscape Character.....	30
17.2.7	Application of Best Practice and the EMP for Landscape Character.....	30
17.2.8	Summary of Impacts to Landscape Character.....	31
17.3	Sensitive Aspect No.2: Visual Amenity.....	33
17.3.1	BASELINE CHARACTERISTICS of Visual Amenity	33
17.3.1.1	STUDY AREA for Visual Amenity.....	33
17.3.1.2	Baseline Context and Character of Visual Amenity in the UWF Replacement Forestry Study Area	33
17.3.1.3	Importance of Visual Amenity.....	33
17.3.1.4	Sensitivity of Visual Amenity	33
17.3.1.5	Trends in the Baseline Environment (the 'Do-Nothing' scenario).....	34
17.3.1.6	Receiving Environment (the Baseline + Trends).....	34
17.3.2	CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics	35
17.3.2.1	Overview of Other Elements, Other Projects or Activities.....	35
17.3.2.2	Cumulative Evaluation Study Area	36
17.3.2.3	Cumulative Information: Baseline Characteristics – Context & Character	37
17.3.3	PROJECT DESIGN MEASURES for Visual Amenity	39
17.3.4	EVALUATION OF IMPACTS to Visual Amenity	40
17.3.4.1	Impact Evaluation Table: Intensification of activity causing visual disharmony, clutter or complexity	41
17.3.4.2	Impact Evaluation Table: Addition of new features or loss of existing features causing visual disharmony, clutter or complexity	45
17.3.4.3	Description and Rationale for Excluded (scoped out) Impacts	49
17.3.5	Mitigation Measures for Impacts to Visual Amenity.....	50
17.3.6	Evaluation of Residual Impacts to Visual Amenity	50
17.3.7	Application of Best Practice and the EMP for Visual Amenity	50
17.3.8	Summary of Impacts to Visual Amenity	51
17.4	Policy Context	53
17.4.1	National Policy.....	53
17.4.2	Regional Policy - Mid-West Regional Planning Guidelines 2010-2022.....	53
17.4.3	North Tipperary County Development Plan 2010 (as varied):	54
17.5	Best Practice Measures	56
17.6	Summary of the Landscape Chapter	57
17.6.1	Summary of UWF Replacement Forestry Impacts	57
17.6.1	Summary of Cumulative Impacts with Other Elements of the Whole UWF Project.....	57
17.6.2	Cumulative Impacts with Other Projects or Activities.....	57

17.7 Reference List 58

List of Figures

Figure No.	Figure Title
Figure RF 17.1	Location of the UWF Replacement Forestry
Figure RF 17.2	Landscape Character within the UWF Replacement Forestry Study Area
Figure CE 17.2	Landscape Character within the Cumulative Evaluation Study Area
Figure RF 17.3	Visual Amenity within the UWF Replacement Forestry Study Area
Figure CE 17.3	Visual Amenity within the Cumulative Evaluation Study Area

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

List of Appendices

Appendix No.	Appendix Title
Appendix 17.1	Landscape

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
UWF	Upperchurch Windfarm

Landscape

Topic

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 factors¹. 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 landscape².

17.1.2 Overview of Landscape in the Local Environment

The landscape setting of the majority of the UWF Replacement Forestry 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 Replacement Forestry is illustrated on OSI Mapping on **Figure RF 17.1: Location of the UWF Replacement Forestry**. 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.

17.1.4 Sensitive Aspects excluded from further evaluation

No Sensitive Aspects were excluded from this topic chapter.

¹ European Landscape Convention (2002),

² Guidelines for Landscape and Visual Impact Assessment (2013)

17.1.5 Overview of the Subject Development

The UWF Replacement Forestry is the subject development, being the subject of a current afforestation license application to the Minister for Agriculture, Food and the Marine.

Table 17-1: Subject Development –UWF Replacement Forestry

<u>Project ID</u>	<u>The Subject Development</u>	<u>Composition of the Subject Development</u>
Element 3	The Subject Development UWF Replacement Forestry (RF)	Replacement Forestry at Foilnaman

Note: The UWF Replacement Forestry is 'Element 3' 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 Replacement Forestry \(Volume C2 EIAR Main Report\)](#).

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 <ul style="list-style-type: none"> Members of the public during the Public Consultation and Information Day See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details..
Guidelines	<ul style="list-style-type: none"> Institute of Environmental Management and Assessment (IEMA) Landscape Institute (UK) 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA, 2013, 3rd Edition).
Desktop	<ul style="list-style-type: none"> North Tipperary County Development Plan 2010 (as varied) 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

Type	Source
	<ul style="list-style-type: none"> Chapter 9: Land Consented Upperchurch Windfarm planning documents <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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

<u>Sensitivity</u>	<u>Description</u>
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

<u>Magnitude of Landscape Impact</u>	<u>Description</u>
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

<u>Visual receptors most susceptible to changes in views and visual amenity</u>	<u>Visual receptors that are less susceptible to changes in views and visual amenity</u>
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).

Introduction, Authors, Sources, Methodology

Topic	Landscape
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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 Replacement Forestry is described in Table 17-8 and illustrated on [Figure RF 17.2: Landscape Character within the UWF Replacement Forestry Study Area](#) (Volume C3 EIAR Figures).

Table 17-8: UWF Replacement Forestry Study Area for Landscape Character

Study Area for Landscape Character	Justification for the Study Area Extents
500m & 2km radius from the boundary of the UWF Replacement Forestry lands	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 Replacement Forestry Study Area

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: Landscape](#) 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 RF 17.1](#)

17.2.1.3 Importance of Landscape Character

Neither the upland or 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

Landscape Character	Character Assessment (classification specific to that document) corresponds to a ‘Medium’ landscape sensitivity for both LCA17 – ‘Upperchurch, Kilcommon & Hollyford Mountain Mosaic’ for the purposes of this appraisal.
	<p>17.2.1.5 Trends in the Baseline Environment (the ‘Do-Nothing’ scenario)</p> <p>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.</p> <p>However, the predominant rural land use matrix of farming and forestry within the study area or wider upland area has not noticeably changed in recent years and is unlikely to change markedly or rapidly in the foreseeable future (see Chapter 9: Land).</p> <p>17.2.1.6 Receiving Environment (the Baseline + Trends)</p> <p>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.</p>
Sensitive Aspect	
Landscape	
Topic	

17.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

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

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

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

17.2.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Landscape Character 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 17.2.2.2.1](#) below.

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 Replacement Forestry 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, Foilnahan Mast, Cummermore Communications Pole and the activities of Forestry and Agriculture have been scoped in for evaluation of cumulative effects to Landscape Character.

17.2.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Replacement Forestry Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 17-9.

Table 17-9: 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, 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 which have previously been assessed as acceptable by An Bord Pleanála.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Project or Activity: Milestone Windfarm Foilnahan Mast Cummermore Communications Pole Forestry activities Agricultural activities	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	

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.

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 17.2: Landscape Character within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

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	<u>Included</u> for the evaluation of cumulative effects
Element 2: UWF Related Works	<u>Included</u> for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	<u>Included</u> for the evaluation of cumulative effects
Element 5: UWF Other Activities	<p><u>Evaluated as excluded</u>: 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</p>
Other Projects or Activities	
Milestone Windfarm Foilnaman Mast Cummermore Communications Pole	<p>Yes, <u>included</u> for the evaluation of cumulative operational stage effects,</p> <p><u>Excluded from evaluation</u> 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 Replacement Forestry or any Other Element of the Whole UWF Project, therefore Milestone Windfarm is outside the timeframe boundary for construction stage impacts.</p>
Forestry activities Agricultural activities	<p>Yes, <u>included</u> for the evaluation of cumulative construction stage effects,</p> <p><u>Excluded from evaluation</u> 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.</p>

Landscape Character	17.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character	
	17.2.2.3.1	Element 1: UWF Grid Connection
Sensitive Aspect	<p>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: Landscape for contextual photographs illustrating the physical land cover of the receiving environment.</p> <p>The Mountphilips Substation element of the <u>UWF Grid Connection</u> along with the westernmost 5km of the 110kV UGC are contained within the rolling lowland farmland context around Newport. The remaining c.23km of the 110kV UGC will be contained within the upland rural context of the Slievefelim to Silvermine Mountains.</p> <p>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.</p> <p>The location of <u>UWF Grid Connection</u> in relation to LCA17, LCA18 and LCA12 is illustrated on Figure GC 17.1. Figure GC 17.1 is included in the UWF Grid Connection EIA Report (2018) in Volume E: Reference Documents.</p>	
	17.2.2.3.2	Element 2: UWF Related Works
Landscape	<p>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: Landscape for contextual photographs illustrating the physical land cover of the receiving environment.</p> <p>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.</p> <p>The location of <u>UWF Related Works</u> in relation to LCA17 is illustrated on Figure RW 17.1: Location of the UWF Related Works, Figure RW 17.1 is included in the UWF Related Works EIA Report (2018) in Volume E: Reference Documents.</p>	
	17.2.2.3.3	Element 4: Already Consented Upperchurch Windfarm
Topic	<p><u>Upperchurch Windfarm</u> is also located within the upland rural context of the Slievefelim to Silvermine Mountains upland area, in LCA17.</p>	

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 Foilnahan 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	
<p>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.</p> <p>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.</p>	

Landscape Character

Sensitive Aspect

Landscape

Topic

17.2.3 PROJECT DESIGN MEASURES for Landscape Character

At the conception of the UWF Replacement Forestry, 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 Replacement Forestry Project Design Measures relevant to Landscape Character

PD ID	Project Design Environmental Protection Measure (PD)
RF-PD 02	The lands will be planted by hand, using spades and handtools.

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

17.2.4 EVALUATION OF IMPACTS to Landscape Character

In this Section, the likely direct and indirect effects of the UWF Replacement Forestry are identified and evaluated. Then the likely cumulative effects of the UWF Replacement Forestry 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 <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
Alteration or division of land cover and vegetation patterns (construction stage)	<i>Intensification of activity causing a reduction in rural tranquillity (operational stage)</i>
Intensification of activity causing a reduction in rural tranquillity (construction stage)	<i>Decommissioning Effects</i>
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.

17.2.4.1 Impact Evaluation Table: Alteration or division of land cover and vegetation patterns

Impact Description

Project Life Cycle Stage: Planting 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 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.

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.

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 (7.6ha), LCA-17 (9.7ha) and LCA-18 (21.8ha). Excavation and soil removal/disruption will take place in all construction works areas, 1.3ha of forestry will be felled along with the removal of 45m of hedgerow from 9 no. locations each of 5m in length and 26 No. mature trees, both in the open countryside and on public road boundaries. Riparian habitats will be temporarily removed at 34 No. crossing points of watercourses along the 110kV UGC route.

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 and

Landscape Character

Sensitive Aspect

Landscape

Topic

- 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

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 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.

Landscape Character

Sensitive Aspect

Landscape

Topic

Landscape Character	Evaluation of Cumulative Impacts – Alteration or division of land cover and vegetation patterns	
	All Elements of the Whole UWF Project	
Sensitive Aspect	<p><u>Cumulative Impact Magnitude:</u> UWF Grid Connection, UWF Related Works and Upperchurch Windfarm works areas overlap in the Knockmaroe and Knockcurraghbola area, in LCA-17. However, the temporary disturbance of land cover in this 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. Each of the elements 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. Nor will there be cumulative effects on vegetation and land cover for other discrete sections of the UWF Grid Connection. 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.</p>	
	Significance of the Cumulative Impact: Slight	
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • The small extent of works for the UWF Grid Connection and the UWF Related Works in the Knockmaroe 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 pre-vailing land cover over the vast majority of construction works areas. 	
	All Elements of the Whole UWF Project with Other Projects or Activities	
	<p><u>Cumulative Impact Magnitude:</u> 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 the negligible magnitude of planting works associated with this Element.</p>	
	Cumulative Impact with Other Projects: Slight to Imperceptible	
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 / replanting 	
	<p>Note: No cumulative evaluation of <u>Other Projects or Activities</u> (Milestone Windfarm, Foilnahan 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).</p>	
Landscape		
Topic		

17.2.4.2 Impact Evaluation Table: Intensification of activity causing a reduction in rural tranquillity

Impact Description

Project Life Cycle Stage: Planting stage

Impact Source: Planting related activities

Cumulative Impact Source: Planting 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.

The construction works could coincide with periodic forest harvesting operations in the upland area of the Slievefelim to Silvermines mountains. This combined 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.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Intensification of activity causing a reduction in rural tranquillity

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-17 and 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

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, 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

Landscape Character	and the associated UWF Grid Connection Access Roads and ancillary works. There will also be another two temporary construction compounds, one at Bealaclave at the midpoint of the 110kV UGC and the other compound at the location of the Consented UWF Substation at the eastern end of the 110kV UGC route. While some sections of the 110kV UGC 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, and the rolling topography, 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.
	<u>Significance of the Impact:</u> Slight Imperceptible
	<u>Rationale for Impact Evaluation:</u>
	<ul style="list-style-type: none"> • As per Table 17-3, 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 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 construction areas and compounds are cleared and restored, 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
Sensitive Aspect	Element 2: UWF Related Works
	<u>Impact Magnitude:</u> 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.
	<u>Significance of the Impact:</u> Imperceptible
	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • 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 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.
Landscape	Element 4: Consented Upperchurch Windfarm
	<u>Impact Magnitude:</u> 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.
	<u>Significance of the Impact:</u> Slight Imperceptible
	<u>Rationale for Impact Evaluation:</u>
Topic	<ul style="list-style-type: none"> • 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.

Evaluation of Cumulative Impacts – Intensification of activity causing a reduction in rural tranquillity

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:

UWF Grid Connection, UWF Related Works and Upperchurch Windfarm construction works areas overlap in the Knockmaroe and Knockcurraghbola area, however as per Section 17.2.3 Project Design Environmental Protection measures, it is part of the project design and timing that construction activities in this area will take place one element at a time, 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 17-3, 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, the Whole UWF Project 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,

Landscape Character

Sensitive Aspect

Landscape

Topic

Landscape Character	working areas tend to be relatively discrete from each other and not generally intervisible. HGV traffic along local and regional roads is likely to have a Low-negligible in-combination effect.
	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.
	Significance of the Cumulative Impact: Slight
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 17-3, 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 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.
Sensitive Aspect	<p>Note: No cumulative evaluation of <u>Other Projects or Activities</u> (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).</p>

Landscape
Topic

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 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:	
<ul style="list-style-type: none"> The exchange of a small section of one characteristic form of land cover in this upland rural area to another 	
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 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, there will also be some minor terracing of steeper slopes to provide maintenance access over the 110kV UGC. 1.8ha (0.3Ha of which is concealed access road) of grassland or forestry land cover will change to stone access road, however these occasional UWF Grid Connection Access Roads 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 Roads is considered to have a negligible magnitude of impact.	
Significance of the Impact: Slight to Imperceptible	

Landscape Character	Sensitive Aspect	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none">• As per Table 17-3, 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 2: UWF Related Works	
		<u>Impact Magnitude:</u> <p>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.</p>	
		<u>Significance of the Impact:</u> Imperceptible	
Landscape	Topic	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none">• 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• The barely discernable above ground expression and permanent changes to land cover resulting from the UWF Related Works.	
		Element 4: Consented Upperchurch Windfarm	
		<u>Impact Magnitude:</u> <p>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.</p>	
		<u>Significance of the Impact:</u> Slight Imperceptible	
		<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none">• 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 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	
		<u>Impact Magnitude:</u> <p>Milestone Windfarm is a 6-turbine windfarm which comprises two planning permissions, the first for 5 turbines at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry, and the second for 2 turbines (of which 1 was granted planning permission) in Knockduff and Inchivara. The locality of the Milestone Windfarm was assessed by the planning authority to have a ‘Medium’ impact</p>	
<u>Significance of the Impact:</u> Not Significant			

Landscape Character	Sensitive Aspect	Rationale for Impact Evaluation:
		<ul style="list-style-type: none"> 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:
		<ul style="list-style-type: none"> As per Table 17-3, 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
Landscape	Topic	Rationale for Impact Evaluation:
		<ul style="list-style-type: none"> As per Table 17-3, 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
		Evaluation of 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: 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.
Landscape	Topic	Significance of the Cumulative Impact: Imperceptible
		Rationale for Cumulative Impact Evaluation:
		<ul style="list-style-type: none"> As per Table 17-3, 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

Landscape Character	<ul style="list-style-type: none"> • Very minor, albeit long term / permanent, imperceptible impacts of the UWF Grid Connection and UWF Related Works, such that they will not noticeably contribute to cumulative impacts in-combination with the Upperchurch Windfarm.
Sensitive Aspect	All Elements of the Whole UWF Project with Other Projects or Activities
	<p><u>Cumulative Impact Magnitude:</u> 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.</p> <p>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.</p> <p>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.</p>
	Significance of the Cumulative Impact: Not Significant
	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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				
<p>Rationale for Excluding: No potential for impacts/ Neutral effects due to:</p> <p>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 a Neutral impact on landscape character.</p>				

17.2.5 Mitigation Measures for Impacts to Landscape Character

Mitigation measures were incorporated into the UWF Replacement Forestry 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 Replacement Forestry.

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

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Landscape Character.

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
<i>Evaluation Impact Table</i>	<i>Section 17.2.4.1</i>	<i>Section 17.2.4.2</i>	<i>Section 17.2.4.3</i>
<i>Project Life-Cycle Stage</i>	<i>Planting</i>	<i>Planting</i>	<i>Operation</i>
<u>UWF Replacement Forestry Impact</u>	Imperceptible	Imperceptible	Neutral
Element 1: UWF Grid Connection	Imperceptible	Slight to Imperceptible	Slight to Imperceptible
Element 2: UWF Related Works	Imperceptible	Imperceptible	Imperceptible
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		
Cumulative Impact:			
All Elements of the Whole UWF Project	Slight	Imperceptible	Imperceptible
All Elements of the Whole UWF Project <i>cumulatively with</i> Other Projects or Activities Milestone Windfarm Foilnahan 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.

Landscape Character
Sensitive Aspect

Landscape
Topic

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 Replacement Forestry 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 Replacement Forestry is described in Table 17-15 and illustrated on **Figure RF 17.3: Visual Amenity within the UWF Replacement Forestry Study Area** (Volume C3 EIAR Figures).

Table 17-15: UWF Replacement Forestry Study Area for Visual Amenity

Study Area for Visual Amenity	Justification for the Study Area Extents
500m & 2km radius from the boundary of the UWF Replacement Forestry lands	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 Replacement Forestry Study Area

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.

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.

Visual Amenity

Sensitive Aspect

Landscape

Topic

17.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

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

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

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

17.3.2.1 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 Replacement Forestry 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, Foilnahan Mast, Cummermore Communications Pole and the activities of Forestry and Agriculture have been scoped in for evaluation of cumulative effects to Visual Amenity.

Visual Amenity

Sensitive Aspect

17.3.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Replacement Forestry Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 17-16.

Table 17-16: Cumulative Evaluation Study Area for Visual Amenity

<u>Cumulative Project</u>	<u>Cumulative Study Area Boundary</u>	<u>Justification for Study Area Extent</u>
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, 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 which have previously been assessed as acceptable by ABP.
Element 2: UWF Related Works		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Project or Activity: Milestone Windfarm Foilnaman Mast Cummermore Communications Pole Forestry activities Agricultural activities	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	

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 CE 17.3: Visual Amenity within the Cumulative Evaluation Study Area** (Volume C3 EIAR Figures).

Table 17-17: Results of the Evaluation of the Other Elements and Other Projects or Activities

<u>Other Elements of the Whole UWF Project</u>	
Element 1: UWF Grid Connection	Included for the evaluation of cumulative effects
Element 2: UWF Related Works	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, watercourse boundaries and areas of scrub. These activities will not generate any adverse effects to visual amenity.

Landscape

Topic

	<p>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.</p> <p>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.</p> <p>Monitoring Activities do not require any works to land, no effects to visual amenity are expected from brief periods of very minor activity.</p>	Visual Amenity
Other Projects or Activities		
Milestone Windfarm	Yes, included for the evaluation of cumulative effects,	Sensitive Aspect
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 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

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’. 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 Kilcommon, 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, the Kilcommon Pilgrim Loop, and the Ormond Way cycle route. These routes are delineated on **Figure GC 17.3: Visual Amenity within the UWF Grid Connection Study Area**. Figure GC 17.3 is included in the UWF Grid Connection EIA Report (2018) in **Volume E: Reference Documents**

Visual Amenity	17.3.2.3.2	Element 2: UWF Related Works
	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. These routes are delineated on Figure RW 17.3: Visual Amenity within the UWF Related Works Study Area . Figure RW 17.3 is included in the UWF Related Works EIA Report (2018) in Volume E: Reference Documents	
	17.3.2.3.3	Element 4: Already Consented Upperchurch Windfarm
	The UWF Related Works and 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.	
	17.3.2.3.4	Element 5: UWF Other Activities
Sensitive Aspect	Not applicable – Element evaluated as excluded. See Section 17.3.2.2.1	
	17.3.2.3.5	Other Projects or Activities
<p>Milestone Windfarm, will comprise 6 turbines when construction is completed, and is located on lands adjacent to the Upperchurch Windfarm, and across a valley from the Telecom Relay Pole.</p> <p>The existing Foilnaman Mast is located on the same hill as the Telecom Relay Pole (UWF Related Works).</p> <p>Cummermore Communications Pole is located c.2km to the southwest of the Upperchurch Windfarm</p> <p>Agriculture and forestry occur throughout the upland study area.</p>		

17.3.3 PROJECT DESIGN MEASURES for Visual Amenity

At the conception of the UWF Replacement Forestry, 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 Replacement Forestry Project Design Measures relevant to Visual Amenity

PD ID	Project Design Environmental Protection Measure (PD)
RF-PD 02	The lands will be planted by hand, using spades and handtools.

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

17.3.4 EVALUATION OF IMPACTS to Visual Amenity

In this Section, the likely direct and indirect effects of the UWF Replacement Forestry are identified and evaluated. Then the likely cumulative effects of the UWF Replacement Forestry 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 <u>Included</u> (Evaluated in the Impact Evaluation Table sections)	Impacts <u>Excluded</u> (Justification at the end of the Impact Evaluation Table sections)
Intensification of activity causing visual disharmony, clutter or complexity (construction stage)	<i>Intensification of activity causing visual disharmony, clutter or complexity (operational stage)</i>
Addition of new features or loss of existing features causing visual disharmony, clutter or complexity (operational stage)	<i>Decommissioning Effects</i>

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.

17.3.4.1 Impact Evaluation Table: Intensification of activity causing visual disharmony, clutter or complexity

Impact Description	
Project Life Cycle Stage:	Construction stage
<u>Impact Source:</u> Construction related activities <u>Cumulative Impact Source:</u> Construction related activities, forestry harvesting <u>Impact Pathway:</u> Visibility	
<u>Impact Description:</u> 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. <u>Impact Quality:</u> Negative	
Evaluation of the Subject Development Impact – Intensification of activity causing visual disharmony, clutter or complexity	
Element 3: UWF Replacement Forestry	
<u>Impact Magnitude:</u> 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	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> • As per Table 17-6, 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 	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
<u>Impact Magnitude:</u> 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 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; the 110kV UGC, the UWF Grid Connection Access Roads and ancillary works, construction activity will be largely transient in nature (moving through the landscape) with periodic access tracks and 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 (110kV UGC, UWF Grid Connection Access Roads and GC Ancillary 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 and the V58 scenic routes on the R503 and	

Visual Amenity	Sensitive Aspect	<p>R497 at Knocknabansha and on the R503 at Rear Cross village, views from settlements will include views of a short section across the slope at Baurnadomeeny from the outskirts of Rear Cross village and more extensive views across the valley from Kilcommon village in addition to the works which pass through the outskirts of the village. Walkers on the Slievefelim Way and Kilcommon Pilgrim Route could encounter works along sections of these walks (3.3km and 3.1km within 500m of works respectively), while the Ormond Way cycle route crosses the 110kV UGC at one point in the Knockcurraghbola area.</p> <p>Due to the degree of visual containment of the Mountphilips substation site and the temporary duration of construction activities, 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.</p> <p><u>Significance of the Impact:</u> Slight Imperceptible</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 17-6, 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 temporary construction areas and compounds are cleared and restored.
		<p>Element 2: UWF Related Works</p> <p><u>Impact Magnitude:</u></p> <p>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).</p> <p>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.</p> <p><u>Significance of the Impact:</u> Imperceptible</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 17-6, 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.
Landscape	Topic	<p>Element 4: Consented Upperchurch Windfarm</p> <p><u>Impact Magnitude:</u></p> <p>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) <i>“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”</i>.</p> <p><u>Significance of the Impact:</u> Not Significant</p> <p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • 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 6-turbine windfarm which comprises two planning permissions, the first for 5 turbines at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry, and the second for 2 turbines (of which 1 was granted planning permission) 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 Cumulative Impacts – Intensification of activity causing visual disharmony, clutter or complexity

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:

UWF Grid Connection, UWF Related Works and Upperchurch Windfarm works areas overlap in the 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 Imperceptible

Visual Amenity	<p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 17-6, 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.
	<p>All Elements of the Whole UWF Project with Other Projects or Activities</p> <p><u>Cumulative Impact Magnitude:</u> 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.</p> <p>No above ground UWF Grid Connection structures inter-visible with the Milestone Windfarm.</p> <p>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.</p> <p>Significance of the Cumulative Impact: Slight <i>(with Forestry)</i>, Not Significant <i>(with Milestone)</i></p> <p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 17-6, 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."
Sensitive Aspect	<p>Note: No cumulative evaluation of <u>Other Projects or Activities</u> (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)</p>

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
<p><u>Impact Source:</u> Presence of above ground structures, permanent alterations to landform/ vegetation patterns</p> <p><u>Cumulative Impact Source:</u> Construction related activities, forestry harvesting</p> <p><u>Impact Pathway:</u> Visibility</p> <p><u>Impact Description:</u> 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 is 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.</p> <p><u>Impact Quality:</u> Negative</p>	
Evaluation of the Subject Development Impact – Addition of new features or loss of existing features causing visual disharmony, clutter or complexity	
Element 3: UWF Replacement Forestry	
<p><u>Impact Magnitude:</u></p> <p>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.</p>	
<u>Significance of the Impact: Imperceptible</u>	
<p><u>Rationale for Impact Evaluation:</u></p> <ul style="list-style-type: none"> • As per Table 17-6, 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 	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
<p><u>Impact Magnitude:</u></p> <p>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 1, Sections A-17.1.2). . Figure GC 17.4 is included in the UWF Grid Connection EIA Report (2018) in Volume E: Reference Documents. 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.</p> <p>The 110kV UGC will be underground 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 and minor terracing of steeper slopes to provide maintenance access. Occasional UWF Grid Connection Access Roads are a typical rural landscape feature that will have a very minor effect on visual amenity. It is considered</p>	

Visual Amenity	that the magnitude of visual impacts caused by the 110kV UGC and the UWF Grid Connection Access Roads will be negligible.
	<u>Significance of the Impact:</u> Imperceptible
Sensitive Aspect	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> As per Table 17-6, 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 and typical nature of UWF Grid Connection access roads.
	Element 2: UWF Related Works
	<u>Impact Magnitude:</u> 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 discernable 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 17.4: Visibility of the Telecom Relay Pole from VP2 on the L-2264-50 Local Road to the east , (also see visibility map at Appendix 17.1 1, Sections A-17.1.3). Figure RW 17.4 is included in the UWF Related Works EIA Report (2018) in Volume E: Reference Documents 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 from any other types of receptor than local roads and residents and for these reasons the magnitude of impact is negligible.
	<u>Significance of the Impact:</u> Imperceptible
	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> As per Table 17-6, 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 4: Consented Upperchurch Windfarm
	<u>Impact Magnitude:</u> 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) <i>“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”</i> .
	<u>Significance of the Impact:</u> Not Significant
Landscape	<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> The rationale provided in the Upperchurch Windfarm LVIA and ABP Inspectors Report (2014, Section 9.55) <i>“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”</i>
	Element 5: UWF Other Activities – N/A, evaluated as excluded, see Section 17.3.2.2.1
Topic	

Cumulative Information: Individual Evaluations of Other Projects or Activities	
Other Project: Milestone Windfarm	
<u>Impact Magnitude:</u> Milestone Windfarm is a 6-turbine windfarm which comprises two planning permissions, the first for 5 turbines at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry, and the second for 2 turbines (of which 1 was granted planning permission) in Knockduff and Inchivara. The locality of the Milestone Windfarm was assessed by the planning authority to have a 'Medium' sensitivity.	
<u>Significance of the Impact:</u> Not Significant	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> The rationale provided in the Milestone Windfarm Planners Report (Tipperary County Council Ref: 12510385, 28th November 2013) – <i>'I consider furthermore that the visual impact in the context of the local and regional topography is acceptable'</i> The rationale provided in the Inchivara Windfarm ABP Inspectors report (ABP Ref: PL92.243611, page 19) – <i>"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"</i> 	
Other Project: Foilnaman Mast	
<u>Impact Magnitude:</u> 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	
<u>Significance of the Impact:</u> Imperceptible	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> The small scale permanent impacts arising from the existing Foilnaman mast 	
Other Project: Cummermore Communication Pole	
<u>Impact Magnitude:</u> 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	
<u>Significance of the Impact:</u> Imperceptible	
<u>Rationale for Impact Evaluation:</u> <ul style="list-style-type: none"> The small scale permanent impacts arising from the existing Cummermore Comms Pole 	
Evaluation of Cumulative Impacts – Addition of new features or loss of existing features causing visual disharmony, clutter or complexity	
All Elements of the Whole UWF Project	
<u>Cumulative Impact Magnitude:</u> 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 potential to cause visual impacts 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.	

Visual Amenity	<p>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.</p> <p>The cumulative magnitude of visual effects is considered to be negligible.</p>
	<p>Significance of the Cumulative Impact: Imperceptible</p> <p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none">As per Table 17-6, negligible magnitude combined with the medium sensitivity of visual receptors within the study areaThe very limited visible expression of the UWF Grid Connection, UWF Related Works or UWF Replacement Forestry in conjunction with the Upperchurch Windfarm
Sensitive Aspect	<p>All Elements of the Whole UWF Project with Other Projects or Activities</p> <p><u>Cumulative Impact Magnitude:</u></p> <p>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 Foilnahan and Cummermore Comms Poles.</p> <p>The UWF Replacement Forestry will not have any discernible in-combination impact other than the potentially positive screening of structures over time.</p> <p>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.</p>
	<p>Significance of the Cumulative Impact: Not Significant</p> <p><u>Rationale for Cumulative Impact Evaluation:</u></p> <ul style="list-style-type: none">As per Table 17-6, negligible magnitude combined with the medium sensitivity of visual receptors within the study areaThe very minor and localised contribution to cumulative impact arising from the Telecom Relay Pole in conjunction with the Foilnahan 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.”
<p>Note: No cumulative evaluation of <u>Other Projects or Activities</u> (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).</p>	
Landscape	
Topic	

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				
<p>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 a Neutral impact on visual amenity.</p>				

17.3.5 Mitigation Measures for Impacts to Visual Amenity

Mitigation measures were incorporated into the UWF Replacement Forestry 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 Replacement Forestry.

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

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Visual Amenity.

17.3.8 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
<i>Evaluation Impact Table</i>	<i>Section 17.3.4.1</i>	<i>Section 17.3.4.2</i>
<i>Project Life-Cycle Stage</i>	<i>Planting</i>	<i>Operational</i>
<u>UWF Replacement Forestry Impact</u>	Imperceptible	Imperceptible
Element 1: UWF Grid Connection	Slight to Imperceptible	Imperceptible
Element 2: UWF Related Works	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	
Cumulative Impact:		
All Elements of the Whole UWF Project	Slight to Imperceptible	Imperceptible
All Elements of the Whole UWF Project <i>cumulatively with</i> Other Projects or Activities Milestone Windfarm Foilnahan 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.

Visual Amenity
Sensitive Aspect

Landscape
Topic

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.

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

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 Archetypes' 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 Archetype 'B – The Lakelands' in the vicinity of Newport (western end of 110kV UGC and Mountphilips substation), into Landscape Archetype 'D – The Uplands' from Castlewaller eastwards to Kilcommon and finally Landscape Archetype '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 Archetype boundaries identified above. That is, 'the Lakelands' portion 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'.

17.5 Best Practice Measures

No UWF Replacement Forestry Best Practice Measures have been developed specifically for Landscape.

17.6 Summary of the Landscape Chapter

UWF Replacement Forestry is located in a rugged rural upland area with 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 is one waymarked trail (Ormond Way Cycle) in the study area.

Sensitive Aspects of Landscape, examined in this topic chapter, include Landscape Character and Visual Amenity.

The UWF Replacement Forestry was evaluated for potential to cause impacts to Landscape as a result of the alteration 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 of the new maturing trees.

The lands will be planted by hand (Project Design Measure), which will reduce to negligible the intensity of planting activities.

17.6.1 Summary of UWF Replacement Forestry Impacts

- Due to the relatively small scale and low intensity of planting activities, adverse impacts to both Landscape Character and Visual Amenity will be imperceptible.

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

As the UWF Replacement Forestry is one part of the Whole UWF Project, the cumulative impacts with the Other Elements of the Whole UWF Project are summarised below.

- The contribution of UWF Replacement Forestry to cumulative effects with the Other Elements will be barely noticeable. The cumulative effects of the Other Elements, to either Landscape Character or Visual Amenity, is expected to range from Imperceptible to Slight.

17.6.2 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 is expected to range from Imperceptible to 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 (currently under construction), and the existing Foilnahan Mast and existing Cummermore Communications Pole. Cumulative impacts to either Landscape Character or Visual Amenity will be Not Significant.

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UWF Replacement Forestry

Volume C2: EIAR Main Report

Chapter 18: Interaction of the Foregoing



Chapter	Interaction of the Foregoing
---------	------------------------------

Contents

18	Interaction between the Environmental Factors	1
18.1	Cross Factor effects between the Environmental Factors	1
18.1.1	Potential Cross-Factor effects to Population (Chapter 6)	1
18.1.2	Potential Cross-Factor effects to Human Health (Chapter 7).....	1
18.1.3	Potential Cross-Factor effects to Biodiversity (Chapter 8)	1
18.1.4	Potential Cross-Factor effects to Land (Chapter 9)	1
18.1.5	Potential Cross-Factor effects to Soils (Chapter 10).....	1
18.1.6	Potential Cross-Factor effects to Water (Chapter 11).....	1
18.1.7	Potential Cross-Factor effects to Air (Chapter 12)	1
18.1.8	Potential Cross-Factor effects to Climate (Chapter 13).....	2
18.1.9	Potential Cross-Factor effects to Material Assets - Built Services (Chapter 14)	2
18.1.10	Potential Cross-Factor effects to Material Assets - Roads (Chapter 15)	2
18.1.11	Potential Cross-Factor effects to Cultural Heritage (Chapter 16)	2
18.1.12	Potential Cross-Factor effects to Landscape (Chapter 17)	2
18.2	Potential Cross Factor Effects – Other Elements of the Whole UWF Project.....	2

List of Figures

<u>Figure No.</u>	<u>Figure Title</u>
No Figures associated with this topic chapter	

Glossary of Terms

<u>Term</u>	<u>Definition</u>
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.

18 Interaction of the Foregoing

18.1 Cross Factor effects between the Environmental Factors

Interaction of the Foregoing is the interaction between the Environmental Factors and 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 are 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, by receiving environmental factor.

18.1.1 Potential Cross-Factor effects to Population (Chapter 6)

No cross-factor effects to **Population**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.2 Potential Cross-Factor effects to Human Health (Chapter 7)

No cross-factor effects to **Human Health**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.3 Potential Cross-Factor effects to Biodiversity (Chapter 8)

No cross-factor effects to **Biodiversity**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.4 Potential Cross-Factor effects to Land (Chapter 9)

No cross-factor effects to **Land**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

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)

No cross-factor effects to **Water**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.7 Potential Cross-Factor effects to Air (Chapter 12)

No cross-factor effects to **Air**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.8 Potential Cross-Factor effects to Climate (Chapter 13)

No cross-factor effects to **Climate**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.9 Potential Cross-Factor effects to Material Assets - Built Services (Chapter 14)

No cross-factor effects to **Material Assets – Built Services**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

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)

No cross-factor effects to **Cultural Heritage**, caused by effects to the other Environmental Factors, were identified by the EIAR Team.

18.1.12 Potential Cross-Factor effects to Landscape (Chapter 17)

Potential cross-factor effects to **Landscape** (character), caused by effects to **Land** (change of use from grassland to native forestry).

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 Grid Connection EIA Report and UWF Related Works EIA Report, both of which are included in **Volume E: Reference Documents**.

UWF Replacement Forestry EIA Report

Volume C2: EIAR Main Report

Chapter 19: Monitoring Arrangements



Chapter	Monitoring Arrangements
---------	-------------------------

Contents

19	Monitoring Arrangements	1
19.1	Introduction	1
19.2	Likely Significant Adverse Effects.....	1
19.3	Non-compliance and Unforeseen Significant Adverse Effects.....	1
19.3.1	Environmental protection measures in the EIA Report	2
19.4	Duration of Monitoring.....	2
19.5	Responsibilities & Management.....	2
19.6	Resourcing of Monitoring Arrangements.....	3
19.7	Conclusion	3

List of Figures

<u>Figure No.</u>	<u>Figure Title</u>
No Figures associated with this topic chapter	

Glossary of Terms

<u>Term</u>	<u>Definition</u>
Environmental Protection Measures	The environmental protection measures including Project Design Measures, Best Practice Measures and Invasive Species Management Plan which were developed during the EIA process.
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

<u>Abbreviation</u>	<u>Full Term</u>
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, monitoring the implementation of the environmental protection measures – Project Design Measures; Best Practice Measures and Invasive Species Management Plan - which have been developed to avoid, prevent or reduce significant effects on the receiving environment.

To facilitate the implementation and monitoring of the environmental protection measures, they have been incorporated into Chapter 5 of the EIAR Report.

19.2 Likely Significant Adverse Effects

The **conclusion for all the sensitive aspects** of the Environmental Factors **is that no significant adverse effects are likely to occur.**

19.3 Non-compliance and Unforeseen Significant Adverse Effects

An Environmental Clerk of Works will be employed during the planting and early growth stages. The environmental protection measures will be used by the Environmental Clerk of Works, as a basis to audit compliance of the Contractors with the measures.

The Environmental Clerk of Works team will have a full time presence on-site during the planting 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' to temporarily stop works over part of the site to avoid either an infringement of the environmental protection measures or an unforeseen adverse environmental event. Works will not be allowed to re-commence until the issue is resolved.

19.3.1 Environmental protection measures in the EIA Report

The current List of environmental protection measures is presented in Table 19-1. The list of measures will be updated post-consent, with any additional requirements of conditions or statutory bodies.

Table 19-1: List of environmental protection measures for UWF Replacement Forestry

Environmental protection measures	Source	Implemented By: Construction Manager/ Project Manager / Env. Clerk of Works / Other
The Project Promoter is committed to implementing the Project Design Measures RF-PD01 to RF-PD15.	EIAR, Ch.5	Project Team and specialist environmental and engineering experts
The Project Promoter is committed to implementing the Invasive Species Management Plan .	Appendix A5.2	Project Team Site Ecologist
The Project Promoter is committed to implementing Best Practice Measures RF-BPM-01 to RF-BPM-03.	EIAR, Ch.5	Project Team Site Ecologist
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

19.4 Duration of Monitoring

As most potential for adverse effects to the environment would occur during the planting stage of the UWF Replacement Forestry, 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).

19.5 Responsibilities & Management

It will be the overall responsibility of the Project Promoter to ensure that the UWF Replacement Forestry is developed as consented. The implementation of this commitment will be the responsibility of the Project Manager and a contractual obligation on the forestry contractors, during the planting stage.

The protection of the environment during planting and early growth will be managed through the UWF Replacement Forestry environmental protection measures - Project Design Measures, Invasive Species Management Plan and Best Practice Measures. During planting monitoring and auditing, of compliance with these measures, will be carried out by an Environmental Clerk of Works, who will be independent of the Forestry Contractor. The Environmental Clerk of Works will work with a suitable qualified team. The Environmental Clerk of Works will prepare weekly Compliance Reports.

During the early growth stage monitoring and auditing will be the responsibility of the Project Promoter for Upperchurch Windfarm. The work will be carried out by the Upperchurch Windfarm Environmental Manager.

19.6 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 planting works with the environmental protection measures. Sufficient resources will also be provided to the Environmental Clerk of works to engage specialist environmental and engineering consultants as required.

19.7 Conclusion

The monitoring arrangements will involve an Environmental Clerk of Works, monitoring the implementation of the environmental protection measures, which have been developed to avoid, prevent or reduce significant effects on the receiving environment.

The Project Promoter will contractually oblige the construction contractors to carry out the works according to all of the environmental protection measures. Any post-construction monitoring will be the responsibility of the Project Promoter for Upperchurch Windfarm. The work will be carried out by the Upperchurch Windfarm Environmental Manager.

Chapter	Monitoring Arrangements
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UWF Replacement Forestry EIA Report

Volume C2: EIAR Main Report

Chapter 20: Executive Summary

EIAR Coordinator:



May 2018

Chapter	Executive Summary of the UWF Replacement Forestry EIA Report
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Contents

20	Executive Summary of the EIAR Main Report	1
20.1	Summary of Chapter 1: Introduction.....	1
20.1.1	Afforestation Licence Application	1
20.1.2	The Subject Development	1
20.1.3	The Whole UWF Project	2
20.2	Summary of Chapter 2: The EIAR Process including Scoping	3
20.2.1	The EIA Directive	3
20.2.2	National Afforestation, Forest Road Construction and Felling Licences	3
20.2.3	The EIA Report.....	4
20.2.4	Presentation of the EIA Report.....	4
20.2.5	EIA Report Review	5
20.3	Summary of Chapter 3: The Scoping Consultations	6
20.3.1	Legislative Context.....	6
20.3.2	Consultation with Public Authorities.....	6
20.3.3	Public Consultation.....	6
20.3.4	On-going consultation	6
20.4	Summary of Chapter 4: Alternatives Considered	7
20.4.1	Alternative Locations.....	7
20.4.2	Alternative Design	7
20.4.3	Alternative Process.....	8
20.4.4	'Do-Nothing' Alternative	8
20.5	Summary of Chapter 5: Description of the Development.....	9
20.5.1	Location and Characteristics of UWF Replacement Forestry.....	9
20.5.2	UWF Replacement Forestry: Planting and Growth Stage	10
20.5.3	Vulnerability of UWF Replacement Forestry to Major Accidents and/or Disasters.....	10
20.6	Summary of Chapter 6: Population	11
20.6.1	Summary of UWF Replacement Forestry Impacts	11
20.6.2	Summary of Cumulative Impacts of the Other Elements of the Whole UWF Project	11
20.6.3	Summary of Cumulative Impacts with Other Projects or Activities	11
20.7	Summary of Chapter 7: Human Health.....	12
20.7.1	Summary of UWF Replacement Forestry Impacts	12
20.7.2	Summary of Cumulative Impacts to Human Health.....	12
20.7.3	Summary of Cumulative Impacts with Other Projects or Activities	12
20.8	Summary of Chapter 8: Biodiversity.....	13

20.8.1	Summary of Effects on European Sites	13
20.8.2	Summary of UWF Replacement Forestry Impacts to the other Sensitive Aspects	14
20.8.3	Summary of Cumulative Impacts with Other Elements of the Whole UWF Project.....	14
20.8.4	Summary of Cumulative Impacts with Other Projects or Activities	15
20.9	Summary of Chapter 9: Land	16
20.9.1	Summary of UWF Replacement Forestry Impacts	16
20.9.2	Summary of Cumulative Impacts of the Other Elements of the Whole UWF Project	16
20.9.3	Cumulative Impacts with Other Projects or Activities.....	16
20.10	Summary of Chapter 10: Soils	17
20.10.1	Summary of UWF Replacement Forestry Impacts	17
20.10.2	Summary of Cumulative Impacts of the Other Elements of the Whole UWF Project	17
20.10.3	Summary of the Cumulative Impacts with Other Projects or Activities.....	17
20.11	Summary of Chapter 11: Water	18
20.11.1	Summary of UWF Replacement Forestry Impacts	18
20.11.2	Summary of the Cumulative Impacts	18
20.11.3	Summary of Impacts from Other Elements of the Whole UWF Project	19
20.12	Summary of Chapter 12: Air	20
20.12.1	Summary of UWF Replacement Forestry Impacts	20
20.12.2	Summary of Cumulative Impacts with Other Elements of the Whole UWF Project.....	20
20.12.3	Summary of Cumulative Impacts with Other Projects or Activities	20
20.13	Summary of Chapter 13: Climate	21
20.13.1	Summary of UWF Replacement Forestry Impacts	21
20.13.1	Summary of the Cumulative Impacts of the Other Elements of the Whole UWF Project	21
20.13.2	Summary of the Cumulative Impacts with Other Projects or Activities.....	21
20.14	Summary of Chapter 14: Material Assets (Built Services)	22
20.14.1	Summary of UWF Replacement Forestry Impacts	22
20.14.2	Summary of the Cumulative Impacts with the Other Elements of the Whole UWF Project	22
20.14.3	Summary of the Cumulative Impacts with Other Projects or Activities.....	22
20.15	Summary of Chapter 15: Material Assets (Roads).....	23
20.15.1	Summary of UWF Replacement Forestry Impacts	23
20.15.2	Summary of Cumulative Impacts with Other Elements of the Whole UWF Project.....	23
20.15.3	Summary of Cumulative Impacts with Other Projects or Activities	23
20.16	Summary of Chapter 16: Cultural Heritage.....	24
20.16.1	Summary of UWF Replacement Forestry Impacts	24
20.16.2	Summary of Cumulative Impacts to Cultural Heritage with the Other Elements of the Whole UWF Project	24

20.16.3	Summary of the Cumulative Impacts with Other Projects or Activities.....	25
20.17	Summary of Chapter 17: The Landscape	26
20.17.1	Summary of UWF Replacement Forestry Impacts	26
20.17.1	Summary of Cumulative Impacts with Other Elements of the Whole UWF Project.....	26
20.17.2	Cumulative Impacts with Other Projects or Activities.....	26
20.18	Summary of Chapter 18: Interaction of the Foregoing.....	27
20.19	Monitoring Arrangements	28
20.20	Summary of UWF Replacement Forestry EIA Report	29

Chapter	Executive Summary of the UWF Replacement Forestry EIA Report
---------	--

20 Executive Summary of the EIAR Main Report

20.1 Summary of Chapter 1: Introduction

20.1.1 Afforestation Licence Application

This Environmental Impact Assessment Report (EIA Report or EIAR¹) has been prepared to accompany the afforestation licence application by EDL to the Minister of the Department of Agriculture, Food and the Marine, for forestry replanting.

The application is called UWF Replacement Forestry throughout this EIA Report. UWF Replacement Forestry is part of a much larger project – the Whole Upperchurch Windfarm (UWF) Project. The other components are UWF Grid Connection; UWF Related Works; Upperchurch Windfarm and UWF Other Activities.

This afforestation licence application comprises a suite of application particulars, which include;

- a. this Environmental Impact Assessment Report comprising an EIAR Main Report, EIAR Figures, EIAR Appendices and a Non-Technical Summary;
- b. Licence Application documents and Drawings;
- c. Appropriate Assessment Reporting and;
- d. Reference Documents included for cumulative assessment.

20.1.2 The Subject Development

UWF Replacement Forestry relates to the planting with forestry, of 6ha of agricultural lands. The lands are located in two adjoining land parcels in Foilnahan townland, near the village of Upperchurch in County Tipperary. The UWF Replacement Forestry will fulfil the replanting obligation which will arise from the felling of forestry for the development of the Whole UWF Project.

It is proposed to plant six hectares (6ha) of agricultural grassland with 20,000 saplings of native woodland species, set in clusters of well-matched native species, to be managed as permanent forest.

All species which will be planted will be silviculturally compatible, native to the Island of Ireland, representative of the native wood land type Oak-Birch-Holly Hazel Woodland, and acceptable to the Forest Service. The lands will be planted with a mixture of tall trees and understory shrubs, and the design includes varied spacing between the clusters of trees. Wide ride-lines between deeper areas of core woodland will be provided which will create an open space with tree-lined boundaries, which is much favoured by birds of prey during the day (e.g. hen harrier) and bats at night, as hunting ground.

Tree guards will be used to protect the saplings and young trees from rabbit damage and the new native woodland will be protected from livestock by perimeter fencing.

A small stream within the Clodiagh River catchment, flows through the western part of the lands. A setback distance of 10m will be established from this watercourse, and no planting works will take place within this area.

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.

An existing agricultural entrance leading off the L-2264-34, will be used to access the new forestry. The existing sightlines at the entrance already comply with North Tipperary County Development Plan 2010 (as amended) Table 10.1: Sightline Requirements.

20.1.3 The Whole UWF Project

The UWF Replacement Forestry is part of a whole project, which comprises the following other elements – UWF Grid Connection, UWF Related Works, 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.

Two other EIA Reports have been prepared to accompany concurrent planning /licence applications to the Competent Authorities for

- UWF Grid Connection – SID planning application to An Bord Pleanála.
- UWF Related Works – Planning Application to Tipperary County Council.

The assessments contained in the UWF Grid Connection EIA Report and UWF Related Works EIA Reports, along with 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 Replacement Forestry EIA Report. These two EIA Reports and the 2013 EIS and other planning documents for Upperchurch Windfarm are included with this planning application in **Volume F: Reference Documents**.

20.2 Summary of Chapter 2: The EIAR Process including Scoping

20.2.1 The EIA Directive

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 2014 Directive is an elaboration/expansion of matters referred to in the 2011 Directive, with additional matters to be considered. It is required that the amending Directive be transposed by the member states, by 16th May 2017. The amending Directive had not been transposed to Irish Planning Law at the time of submission of this planning application (June 2018). These application documents 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.

20.2.2 National Afforestation, Forest Road Construction and Felling Licences

Under the Forestry Regulations 2017 (SI No 191 of 2017), all applications for licences for afforestation require the prior written approval of the Minister for Agriculture, Food and the Marine. Before the Minister can grant approval for afforestation, the Minister must first determine if the project is likely to have a significant environmental effect.

The subject afforestation licence application is for afforestation of 6 hectares and therefore sub-threshold for environmental impact assessment under Forestry Regulations 2017; Part 7: Environmental Impact Assessment. However, the application is qualified by Schedule 3 of the Regulations.

In Schedule 3: *Criteria to determine if a sub-threshold project should be subject to an environmental impact assessment*, it states that the;

Characteristics of projects must be considered with particular regard to cumulation with other existing and approved projects (1.(b)Schedule 3;) and

The likely significant effects of projects on the environment must be considered, taking into account the cumulation of the impact with the impact of other existing and approved projects (3.(g)Schedule 3).

UWF Replacement Forestry is part of the Whole UWF Project, one element of which, Upperchurch Windfarm, did require that an environmental impact assessment be carried out. In order that a cumulative assessment of the impact, with the impact of other existing and approved projects, can be carried out for the afforestation licence, an EIA Report has been prepared.

20.2.3 The EIA Report

In the EIA Report, the following environmental factors are examined by competent experts² - Population & Human Health; Biodiversity³; 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 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 environmental factors. However all impacts, including impacts considered to be neutral, are presented in order to facilitate an evaluation of the cumulative effects of the UWF Replacement Forestry together with the Other Elements of the Whole Project and with other existing or consented projects or activities in the area.

20.2.4 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 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: 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 EIAR Appendices.**
- A **Non-Technical Summary** is presented in a handy, short separate volume with figures included. This Summary is also contained in a separate volume – Volume C1 Non-Technical Summary.

² Competent Experts: Article 5(3) Directive 2014/52/EU

³ Referred to as 'Flora and Fauna' in Directive 2011/92/EU

20.2.5 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 Licencing 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 with Public Authorities, Statutory Bodies and other interested parties and presentations to The Public in the general area of development, was carried out as part of the overall consultation on the Whole UWF Project.

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 this EIA Report; and in the methodology employed to examine all the environmental factors.

20.3.2 Consultation with Public Authorities

Initially, UWF Replacement Forestry was proposed for a site in Firoda, County Kilkenny. Feedback specific to UWF Replacement Forestry was received from Kilkenny County Council – both from the Planning and the Environment Section - by letter, phone calls and a meeting. Kilkenny County Council requested that an alternative location for the new forestry be considered on Biodiversity, Road Safety and Cultural Heritage grounds. This feedback was given due consideration and an alternative location for UWF Replacement Forestry was identified at Foilnahan, County Tipperary.

During discussions on the Whole UWF Project, NPWS expressed a preference for forestry replanting to be carried out in the same general area as where the felling occurred and Tipperary County Council also echoed this preference.

20.3.3 Public Consultation

As part of the public consultation for the Whole UWF Project which includes UWF Replacement Forestry, 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 afforestation licence application to the Minister of Agriculture, Food and the Marine will be available for inspection on the Applicant's dedicated project website at www.upperchurchwindfarm.ie. The project website will also include details of submission/observation procedures 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 Replacement Forestry resulted from a process of consideration of reasonable and practicable alternative locations, alternative design and alternative processes. 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

The following types of lands were investigated when looking for alternative locations for the Replacement Forestry:

- Lands that have already received technical approval from the Forest Service **or**
- Lands that can achieve technical approval from the Forest Service.

Three alternative locations were investigated for planting;

- **Site A:** Technically approved lands (5.12ha) at Ballaghaderreen, Co. Roscommon.
- **Site B:** Technically approved lands (4ha) at Firoda Upper, Co. Kilkenny.
- **Site C:** Lands (6ha) at Foilnaman, Co. Tipperary, near Upperchurch Windfarm, technically suitable for afforestation but without approval.

During the investigations of alternative locations, the lands at Ballaghaderreen, Co. Roscommon became unavailable to the promotor. Site B in Kilkenny and Site C in Tipperary then became the alternatives and were compared for environmental effects on the Environmental Factors.

Site C: Foilnaman, County Tipperary was more suitable in terms of effects on Biodiversity, Water, Roads and Cultural Heritage. Also, NPWS were supportive of a new native woodland proximate to the UWF Hen Harrier Scheme in Tipperary. For all of the above reasons **Site C was chosen**.

20.4.2 Alternative Design

Two alternatives were considered for the design of the replacement forestry;

Design A: Commercial Conifer Plantation: monoculture non-native conifer plantation to replace the Whole UWF Project felling of similar type conifers. Commercial harvest when mature.

Design B: Permanent Native Woodland: The lands to be planted with a mixture of native trees both deciduous and conifer. Permanent woodland – no harvest.

Design B: Permanent Native Woodland was chosen as the design of the replacement forestry in Foilnaman. A permanent native woodland will be created, which will enhance biodiversity by encouraging the abundance and diversity of native woodland species. The loss of commercial sale of forest will be neutral in terms of the overall value of the Whole UWF Project.

20.4.3 Alternative Process

Two alternative processes were considered

Process A: Planting in geometric plan; using machinery; installing drainage channels; and growth management with fertilisers and weed and pest control chemicals.

Process B: Planting by hand; incorporating wide 'Ride Lines' being left unplanted to encourage hen harrier prey species (smaller birds) to nest and facilitate hunting by hen harrier and bats along the woodland boundaries; and management of growth by thinning and without fertilisers, herbicides and pesticides. Process B incorporates mitigation measures such as ride lines and non-chemical use to encourage biodiversity. These mitigation measures are incorporated into the Project Design Measures.

The environmentally sympathetic process – Process B was chosen as the best choice environmentally in the context of management of this woodland with conservation as the primary objective, rather than a commercial tree crop.

20.4.4 'Do-Nothing' Alternative

There is a replanting obligation for the felling of all forestry (except for certain exceptions), under the provisions of the Forestry Act 2014. The felling required for the Whole UWF Project does not fall under exceptions and therefore, there is no legal 'do-nothing' alternative.

20.5 Summary of Chapter 5: Description of the Development

20.5.1 Location and Characteristics of UWF Replacement Forestry

UWF Replacement Forestry relates to the planting with forestry, of agricultural lands the purpose of which is to fulfil the replanting obligation which will arise from the felling of forestry for the development of the whole UWF project.

Located at Foilnahan townland, near Upperchurch, County Tipperary, 6 hectares (6ha) of grassland at will be planted with native woodland species, set in clusters of well-matched native species. There will be varied spacing created between the clusters according to Forest Service recommendations. A mixture of tall trees and understory shrubs will be planted, and the design includes wide ride-lines between deeper areas of core woodland. The ride-lines will create open spaces with tree-lined boundaries, which is much favoured by birds of prey during the day (e.g. hen harrier) and bats at night as hunting ground. A mixture of land cover – tall grasses, short grasses and scrub will be maintained under the planting and in the ride lines. Tree guards will be used to protect the saplings and young trees from rabbit damage. A livestock-proof fence will be erected around the perimeter of the planting.

The lands to be afforested are currently in two agricultural landholdings. A small watercourse, with an existing culvert crossing, runs through the centre. The existing riparian habitat along this watercourse will be enhanced through planting with hazel, alder and willow species and the entire afforestation land will be protected from livestock by the perimeter fencing.

There is a change of use required for an existing agricultural entrance to agricultural and forestry entrance which will remain in permanent use. This change of use is part of UWF Related Works – RW Ancillary Works.

The UWF Replacement Forestry will be designed and planted in accordance with the *Forest Service (2006) Information Note No. 5: Establishment, Design and Stocking Densities of New Native Woodland* and *Felling and Reforestation Policy published by the Forest Service (May 2017)*.

20.5.2 UWF Replacement Forestry: Planting and Growth Stage

UWF Replacement Forestry Planting Stage: Tree planting will be carried out by 4 No. forestry professionals. Tree saplings, wooden fence posts and fencing wire and gates will be imported to the site by 4WD vehicle.

UWF Growth Stage: Once planted, the trees will go through numerous stages of growth from sapling, through to maturity, old age and eventual decay with natural regeneration occurring through the lifecycle of the native wood. Other than thinning activities and grass/scrub management, natural maturation, old age and regeneration, no other changes to the native woodland are expected. Felling is not envisaged.

Use of Natural Resources: 6ha of grassland will be planted with mixed species to create a native woodland, comprising tall trees and understory shrubs, along with wide ride-lines, and a mix of tall grasses, short grasses and scrub land cover maintained during the growth stage. This will enhance biodiversity in the area. New trees and shrubs will be set back from the watercourse which runs through the UWF Replacement Forestry site. The existing riparian habitat will be enhanced through the planting with hazel, alder and willow species and the lands will be protected from livestock by the perimeter fence. Planting will be carried out by hand using spades. Small localised patches of disturbed soil will occur at the sapling tree trunks.

Emissions – Planting and Growth Stage: Negligible.

Waste - Planting and Growth Stage - such as packaging, and excess planting materials will be generated in very small quantities and this waste will be removed at source and disposed of in an appropriate licensed facility.

20.5.3 Vulnerability of UWF Replacement Forestry to Major Accidents and/or Disasters

The UWF Replacement Forestry **is not vulnerable to Major Accidents**, due to the negligible volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during the planting and growth stages. Furthermore there are no Seveso sites in proximity to the UWF Related Works site.

The UWF Replacement Forestry **is not vulnerable to land slippage** as the afforestation site is located on agricultural grassland which is inherently stable and no excavations will occur – planting will be carried out by hand. Therefore it is considered that the likelihood of land slippage is **Extremely Unlikely**.

A flood risk assessment was carried out by Hydro Environmental Services (HES), who conclude that although a section of the UWF Replacement Forestry site is located in a mapped fluvial Flood Zone A (100-year flood zone), there will be no new permanent infrastructure (roads or watercourse crossing structures) required for the forestry. In addition, the planting will be carried out by hand with minimal disturbance to soil. The authors of the Flood Risk Assessment concluded that the UWF Replacement Forestry **is not vulnerable to flooding** and therefore it is considered that the likelihood of flooding is **Extremely Unlikely**.

20.6 Summary of Chapter 6: Population

UWF Replacement Forestry is located in Foilnahan, 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 Replacement Forestry 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 Replacement Forestry Impacts

- Positive impacts to the Local Economy will be Neutral, due to the very small scale of spend, small number of personnel, and the fact that trees for the new woodland will be purchased outside the area.

20.6.2 Summary of Cumulative Impacts of the Other Elements of the Whole UWF Project

As UWF Replacement Forestry is one element of the larger Whole Upperchurch Windfarm Project (Whole UWF Project), the potential for cumulative effects of the 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.

20.6.3 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 all of the Elements of the Whole UWF Project together with 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 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 Replacement Forestry 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, Transient People (walkers/cyclists, road users, farm/forestry workers etc.) and Kilcommon National School (only relevant to UWF Grid Connection).

20.7.1 Summary of UWF Replacement Forestry Impacts

- No negative or positive cross-factor health impacts are likely to occur to Local Residents & Community or Transient People, as a consequence of the development of UWF Replacement Forestry.
- There is no potential for impacts to Kilcommon National School, due to separation distances.

20.7.2 Summary of Cumulative Impacts to Human Health

As UWF Replacement Forestry is one element of the larger Whole Upperchurch Windfarm Project (Whole UWF Project), the cumulative effects of the Other Elements, in particular UWF Grid Connection, UWF Related Works and Upperchurch Windfarm is presented to show the totality of the project.

- UWF Replacement Forestry will not cause cumulative effects to Human Health.
- No cumulative negative health effects due to the Other Elements are expected.
- Cumulative positive effects to Local Residents & Community due to combined increased employment, are expected to be of Slight significance.

20.7.3 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 Other Elements of the Whole UWF Project (UWF Grid Connection, UWF Related Works and Upperchurch Windfarm) and the Bunkimalta Windfarm, are expected to be Imperceptible in the context of the size of the Population in the wider upland area.

20.8 Summary of Chapter 8: Biodiversity

The development of UWF Replacement Forestry will involve the planning of 6ha of lands with native Oak-Birch-Holly and Hazel woodland. This woodland will be permanent woodland and will not be harvested commercially. The new wood has been designed to the benefit of Hen Harrier, and is located on lands adjoining Upperchurch Hen Harrier Scheme lands. The lands to be afforested are located in the River Suir catchment, upstream of the Lower River Suir SAC, and to the east of the Slievefelim to Silvermines SPA.

Surveys of the site recorded typical upland grassland habitats and bird species, while low numbers of non-volant mammals, amphibians and reptiles were recorded. A stream, with fisheries value, flows through the western portion of the lands.

The Sensitive Aspects of Biodiversity which were evaluated in this topic chapter are: European Sites; Hen Harrier, General Bird Species, Non-Volant Mammals, and Amphibians & Reptiles. Although UWF Replacement Forestry will not adversely affect National Sites; Aquatic Habitats & Species, Terrestrial Habitats, Bats, and the Marsh Fritillary butterfly, these Sensitive Aspects were 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.

Environmental protection measures (15 no.) have been integrated into the project design of the UWF Replacement Forestry to ensure that significant effects to Aquatic Species, Hen Harrier and Otter are avoided or reduced. The planting of the new native woodland will be carried out by hand and to Department of Agriculture best practice, which will minimise effects to biodiversity.

In addition to the Project Design Measures, 3 no. Best Practice Measures will be implemented during the planting and growth stages of the UWF Replacement Forestry, these measures will provide further protection with regard to Reptiles and will provide protection against the spread of invasive species. Invasive Species will be managed under an Invasive Species Management Plan.

The Best Practice Measures and Invasive Species Management Plan are included with the afforestation licence application as Appendix 5.1 and Appendix 5.2, respectively, in Volume C4: EIAR Appendices.

20.8.1 Summary of Effects on European Sites

In relation to European Sites, it was concluded in the NIS (See Volume D), 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 D: *Appropriate Assessment Reporting*.

20.8.2 Summary of UWF Replacement Forestry Impacts to the other Sensitive Aspects

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

- Impacts to Hen Harrier will be **Very Significant and Positive** as a result of the UWF Replacement Forestry, this is due to the provision of ride lines within the new permanent native woodland, and the on-going management of the woodland to the benefit of Hen Harrier.
- Impacts to General Bird Species as a result of the UWF Replacement Forestry will be Slight adverse in relation to habitat loss to Golden Plover and Meadow Pipit and Slight Positive due to habitat enhancement effects to General Bird species.
- In relation to Non-Volant Mammals, positive impacts are expected to Badger (habitat gain) as a consequence of the development of UWF Replacement Forestry. Habitat loss effects to Otter and Other Mammals (Irish Hare, Pine Marten, Fallow Deer) will be Neutral.
- Neutral effects to Amphibians & Reptiles are expected as a consequence of the development of UWF Replacement Forestry.
- UWF Replacement Forestry will not cause effects to National Sites, Aquatic Habitats & Species, Terrestrial Habitats, Bats or to Marsh Fritillary.

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

As UWF Replacement Forestry 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 Hen Harrier will remain **Positive and Significant** when both adverse effects of UWF Grid Connection, UWF Related Works and Upperchurch Windfarm along with the Very Significant Positive effects of the Upperchurch Hen Harrier Scheme (UWF Other Activities) are taken into consideration.
- In-combination impacts to General Bird Species will remain cumulatively Slight adverse in relation to habitat loss effects to Golden Plover and Meadow Pipit and cumulatively slight positive in relation to habitat enhancement effects to General Bird Species, when all Elements are taken into consideration. Cumulative displacement/disturbance effects to Golden Plover as a result of the Other Elements (only) will be Not Significant.
- Cumulative effects to Non-Volant Mammals will be adverse when the Other Elements are taken into consideration. Cumulative adverse impacts 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.
- There is no potential for in-combination impacts to Non-Volant Mammals or Amphibians & Reptiles.

Although UWF Replacement Forestry will not cause effects to National Sites, Aquatic Habitats & Species, Terrestrial Habitats, Bats or to Marsh Fritillary, and therefore will not contribute to cumulative effects on these Sensitive Aspects, in order to show the totality of the project, an overview of the in-combination impacts of the Other Elements of the Whole UWF Project is presented below:

- Cumulative adverse effects of the Other Elements to Aquatic Habitats & Species will range from Slight to Moderate.

- Cumulative effects of the Other Elements to Terrestrial Habitats will be Not Significant in relation to adverse habitat reduction or hedgerow severance and Moderate positive in relation to habitat enhancement effects.
- Cumulative adverse effects of the Other Elements to Bats will be Imperceptible or Not Significant.
- Cumulative adverse impacts of the Other Elements to Marsh Fritillary will be Slight.
- There is no potential for cumulative impacts of the Other Elements to National Sites as the UWF Grid Connection will be the only element with potential to cause effects (effects will be Neutral).

20.8.4 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 Replacement Forestry together with the Other Elements of the Whole UWF Project with the consented Bunkimalta Windfarm, Castlewaller Windfarm and Forestry activities.

- Cumulative impacts to Hen Harrier will be Neutral, when the consented Bunkimalta Windfarm and Castlewaller Windfarm and forestry activities are considered in-combination with all Elements of 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.
- There is no potential for cumulative effects to Amphibians & Reptiles with Other Projects or Activities.

Although UWF Replacement Forestry will not cause effects to National Sites, Aquatic Habitats & Species, Terrestrial Habitats, Bats or to Marsh Fritillary, and therefore will not contribute to cumulative effects on these Sensitive Aspects, in order to show the totality of the project, an overview of the in-combination impacts of the Other Elements of the Whole UWF Project with Other Projects or Activities Bunkimalta Windfarm, Castlewaller Windfarm, Newport Distributor Road, and the activities - Forestry, Agriculture and Turf-Cutting), is presented below:

- 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 Slight cumulative reductions in aquatic habitat quality.
- Cumulative impacts of the Other Elements of the Whole UWF Project 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 the Other Elements of the Whole UWF Project with Other Projects or Activities are expected to National Sites, Terrestrial Habitats, or Bats.

The authors conclude that **no significant adverse effects to Biodiversity are likely to occur as a result of the development of the UWF Replacement Forestry**, either alone or in combination with Other Elements of the Whole UWF Project or Other Projects or Activities.

The UWF Replacement Forestry on its own will result in very significant positive effects to Hen Harrier.

20.9 Summary of Chapter 9: Land

The UWF Replacement Forestry is located in the rural countryside in County Tipperary, landuse within the site boundary is Agriculture. It is proposed to permanently change this land use to Forestry, through the planting of the 6ha site with native woodland species.

Sensitive Aspects of Land which were evaluated in this topic chapter include Agricultural Land and Forestry Land.

20.9.1 Summary of UWF Replacement Forestry Impacts

- No impacts to either Agricultural Land or Forestry Land are expected to occur as a consequence of the development of UWF Replacement Forestry.

20.9.2 Summary of Cumulative Impacts of the Other Elements of the Whole UWF Project

As UWF Replacement Forestry is one element of the larger Whole Upperchurch Windfarm Project (Whole UWF Project), the potential for cumulative effects was examined for these Other Elements (in particular UWF Grid Connection, UWF Related Works and Upperchurch Windfarm).

- As the UWF Replacement Forestry will not cause effects to Agricultural Land or Forestry Land itself, there is no potential for this Element to have cumulative impacts with any of the Other Elements of the Whole UWF Project.
- Cumulative impacts to Agricultural Land and Forestry Land, of the Other Elements with each other will not be greater than Imperceptible. These cumulative impacts relate to loss of use and connectivity of lands during the construction stage and early operational stage.

20.9.3 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 Replacement Forestry will be planted on agricultural lands. Soils in the area are not designated and comprise mainly mineral or organic (peaty) topsoil over glacial tills. The underlying bedrock mainly comprises volcanic meta-sediments.

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 Replacement Forestry Impacts

- The UWF Replacement Forestry will cause Neutral impacts to Local Soils, Subsoils & Bedrock, this is mainly due to the small scale of works, planting by hand and no use of large machinery,
- There is no potential for UWF Replacement Forestry to cause impacts to the Lower River Shannon SAC as the lands are not located within the SAC boundary, with a separation distance of 3km.
- There is no potential for UWF Replacement Forestry 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 14km.

20.10.2 Summary of Cumulative Impacts of the Other Elements of the Whole UWF Project

Although the UWF Replacement Forestry will not cause impacts to the sensitive aspects of soils, as it is one element of the larger Whole Upperchurch Windfarm Project (Whole UWF Project), the potential for cumulative effects of these Other Elements was examined (in particular the construction works relating to UWF Grid Connection, UWF Related Works and Upperchurch Windfarm).

- Cumulative impacts to Local Soils, Subsoils & Bedrock of 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.

20.10.3 Summary of the Cumulative Impacts with Other Projects or Activities

There is no potential for UWF Replacement Forestry to cause either impacts to the Sensitive Aspects with Other Projects or Activities, and therefore there is no potential for cumulative impacts with Other Projects or Activities. Cumulative impacts of the Other Elements 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.

20.11 Summary of Chapter 11: Water

The development of UWF Replacement Forestry will involve the planning of 6ha of lands with deciduous woodland. This woodland will be permanent woodland and will not be harvested commercially. A stream flows through the western part of the lands, which forms part of the local Clodiagh River surface water body catchment, which is within the regional River Suir catchment. The Lower River Suir SAC is located over 12km downstream of the UWF Replacement Forestry lands.

The sensitive aspects of Water evaluated in this topic chapter include: Local Surface Water Bodies and the Lower River Suir SAC.

Other sensitive aspects of Water which are included in this chapter in order to show the totality of the whole project are Local Groundwater Bodies, Local Wells & Springs, Lower River Shannon SAC, Bleanbeg Bog NHA and Local Water Dependent Habitats – UWF Replacement Forestry will not effect these sensitive aspects.

Environmental protection measures have been integrated into the design of the UWF Forestry to avoid or reduce water quality effects, and include; planting the new native woodland by hand; no use of herbicides or pesticides, no storage of fuels on the lands, implementing a water set-back area from the watercourse and using the existing crossings points over the watercourse to access the lands with no upgrades or any other instream works required at these crossing points.

20.11.1 Summary of UWF Replacement Forestry Impacts

The likely adverse impacts to the individual Sensitive Aspects are outlined below:

- Impacts to Local Surface Water Bodies (specifically the Clodiagh River) and to the Lower River Suir SAC as a consequence of the UWF Replacement Forestry, will be no greater than Imperceptible adverse.
- The UWF Replacement Forestry will not cause impacts to Local Groundwater Bodies, Local Wells & Springs, Lower River Shannon SAC, Bleanbeg Bog NHA or Local Water Dependent Habitats.

20.11.2 Summary of the Cumulative Impacts

As the UWF Replacement Forestry 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 Related Works, Upperchurch Windfarm and UWF Grid Connection).

- In-combination impacts to Local Surface Water Bodies of UWF Replacement Forestry with the Other Elements of the Whole UWF Project, ranged from Imperceptible to Slight-Moderate,
- In-combination impacts to Lower River Suir SAC of UWF Replacement Forestry with the Other Elements of the Whole UWF Project will remain Imperceptible,
- There is no potential for UWF Replacement Forestry to contribute to cumulative effects to Local Groundwater Bodies, Local Wells & Springs, Lower River Shannon SAC, Bleanbeg Bog NHA or Local Water Dependent Habitats. With the exception of Bleanbeg Bog NHA, the in-combination effects of the Other Elements will not be greater than Imperceptible. There is no potential for cumulative impacts to Bleanbeg Bog NHA, as UWF Grid Connection is the only Element which has the potential to cause effects to this sensitive aspect.

20.11.3 Summary of Impacts from Other Elements of the Whole UWF Project

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 and the Newport Distributor Road, which are both consented projects and could be constructed during the same period as these Whole UWF Project Elements.

- UWF Replacement Forestry will not contribute to cumulative effects with Other Projects or Activities.
- Cumulative impacts of the Other Elements of the Whole UWF Project to Local Surface Water Bodies only relates to UWF Grid Connection, which together with Bunkimalta Windfarm and Newport Distributor Road could cause Slight adverse impacts to Local Surface Water Bodies (in particular the Clare River and Newport (Mulkear) River catchments).
- Cumulative impacts of the Other Elements (UWF Grid Connection, UWF Related Works and Upperchurch Windfarm), with Bunkimalta Windfarm and Newport Distributor Road, to the Lower River Shannon SAC will be 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 UWF Replacement Forestry, 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 Replacement Forestry 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 Kilcommon and Upperchurch.

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.

20.12.1 Summary of UWF Replacement Forestry Impacts

- No Impacts or Neutral Impacts are expected to occur to Local Residents & Community and to Transient People, this is due to the planting of the lands by hand, which avoids both the use of large machinery and the presence of large volumes of excavated soils, and due to the very low level of activities associated with annual management during the growth stage. In addition, as the UWF Replacement Forestry does not include any electrical or communications equipment, the new woodland will not contribute to EMF levels in the vicinity.

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

As UWF Replacement Forestry 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, UWF Related Works and Upperchurch Windfarm).

- UWF Replacement Forestry will not contribute to cumulative impacts to Local Residents & Community or Transient People.
- Cumulative impacts to Local Residents & Community of the Other Elements of the Whole UWF Project with each other will be no greater than Slight in relation to increases in ambient dust levels, Moderate in relation to ambient noise levels during construction and Imperceptible in relation to increased EMF emissions.
- Cumulative impacts to Transient People of the Other Elements of the Whole UWF Project with each other (UWF Related Works, UWF Grid Connection and Upperchurch Windfarm) will be no greater than Imperceptible to Slight in relation to increases in EMF emissions.

20.12.3 Summary of Cumulative Impacts with Other Projects or Activities

There is no potential for cumulative impacts of UWF Replacement Forestry 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 Replacement Forestry is one Element of the Whole Upperchurch Windfarm Project. The purpose of UWF Replacement Forestry is to fulfil replanting obligations as a result of the forestry felling associated with the Other Elements of the Whole UWF Project (in particular UWF Grid Connection, UWF Related Works and Upperchurch Windfarm).

20.13.1 Summary of UWF Replacement Forestry Impacts

- UWF Replacement Forestry has no potential to directly positively directly impact Climate through increasing renewable energy production - as the UWF Replacement Forestry itself will not generate renewable electricity. *The positive impact of the renewable electricity produced by Upperchurch Windfarm is described in Section 20.13.2 below.*
- The UWF Replacement Forestry 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.

20.13.1 Summary of the Cumulative Impacts of the Other Elements of the Whole UWF Project

As UWF Replacement Forestry 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 Related Works 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.

20.13.2 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 Replacement Forestry 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.

In relation to the Electricity Transmission System, the UWF Replacement Forestry does not comprise any electrical parts and is not located near any transmission system assets.

20.14.1 Summary of UWF Replacement Forestry Impacts

- No potential for impacts to Local Residents & Community, as the planting or management of UWF Replacement Forestry will not involve the use of large machinery or deep excavations.
- No potential for UWF Replacement Forestry to cause impacts to the Electricity Transmission System, as the absence of electrical parts and interaction with the transmission system assets.

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

As UWF Replacement Forestry 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 Replacement Forestry 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.

20.14.3 Summary of the Cumulative Impacts with Other Projects or Activities

There is no potential for either UWF Replacement Forestry 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)

Access to UWF Replacement Forestry is from the **Local Road** L2264-34, through an existing farm entrance. The existing sightlines and size of this entrance are adequate for the UWF Replacement Forestry activities and no widening or other works are required.

Sensitive Aspects evaluated in this topic chapter include Public Roads and Road Users.

The main volume of traffic associated with UWF Replacement Forestry will occur during its planting stage, however traffic volumes will be extremely low, and less than the typical traffic from a dwelling house. Traffic volumes will be even less during the growth stage, and as the new native woodland will be permanent woodland and will not be harvested – no harvesting traffic will occur.

20.15.1 Summary of UWF Replacement Forestry Impacts

- Impacts to Public Roads or Road Users will be neutral.

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

As UWF Replacement Forestry 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 UWF Grid Connection, UWF Related Works and Upperchurch Windfarm).

- UWF Replacement Forestry will not cause cumulative effects with Other Elements,
- Cumulative impacts to Public Roads and Road Users, as a consequence of the Other Elements of the Whole UWF Project, will range from cumulatively Imperceptible to Slight.

20.15.3 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

UWF Replacement Forestry is located in the eastern extent 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).

There are no Recorded Legally Protected Sites or Other Recorded Sites either within or in close proximity to the UWF Replacement Forestry lands.

UWF Replacement Forestry is located in the townland of Foilnahan. The townland boundary of Foilnahan with Knockcurraghbola Commons townland forms part of the boundary of the UWF Replacement Forestry lands. Within the wider area, there are 3 Previously Unrecorded Sites (2 wells and a quarry) which will have theoretical visibility of the new woodland.

UWF Replacement Forestry was evaluated for potential to damage cultural heritage sites during initial groundworks in the planting stage. The maturing woodland was also evaluated for potential to cause visual impacts during its lifetime.

20.16.1 Summary of UWF Replacement Forestry Impacts

- There is no potential for effects to Recorded Legally Protected Sites or Other Recorded Sites,
- As the new woodland will be planted by hand using spades, with no works required to townland boundaries, it is considered that impacts to Previously Unrecorded Sites or Unrecorded Subsurface Sites are not likely to occur,
- UWF Replacement Forestry is not expected to cause visual impacts to any Sensitive Aspect of Cultural Heritage.

20.16.2 Summary of Cumulative Impacts to Cultural Heritage with the Other Elements of the Whole UWF Project

As UWF Replacement Forestry 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 and above ground structures associated with the Other Elements).

- There is no potential for UWF Replacement Forestry to cause cumulative effects,
- Cumulative effects with the Other Elements are limited to Previously Unrecorded Sites, where 2 townland boundaries will be effected by both the UWF Grid Connection and UWF Related Works, 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 Other Elements, the cumulative visual impact to Recorded Legally Protected Sites caused by the Telecom Relay Pole (UWF Related Works) cumulatively with the Consented UWF Turbines, is considered Not Significant.

20.16.3 Summary of the Cumulative Impacts with Other Projects or Activities

There is no potential for UWF Replacement Forestry 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 Related Works together with Other Projects (Milestone Windfarm, Foilnaman Mast and Cummermore Communications Pole).

- Cumulative effects to Recorded Legally Protected Sites or Previously Unrecorded Sites will be no greater than Slight Adverse as a consequence of the UWF Replacement Forestry cumulatively with Other Projects or Activities.
- There is no potential for cumulative effects with Other Recorded Sites or Unrecorded Subsurface Sites.

20.17 Summary of Chapter 17: The Landscape

UWF Replacement Forestry is located in a rugged rural upland area with 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 is one waymarked trail (Ormond Way Cycle) in the study area.

Sensitive Aspects of Landscape, examined in this topic chapter, include Landscape Character and Visual Amenity.

The UWF Replacement Forestry was evaluated for potential to cause impacts to Landscape as a result of the alteration 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 of the new maturing trees.

The lands will be planted by hand (Project Design Measure), which will reduce to negligible the intensity of planting activities.

20.17.1 Summary of UWF Replacement Forestry Impacts

- Due to the relatively small scale and low intensity of planting activities, adverse impacts to both Landscape Character and Visual Amenity will be imperceptible.

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

As the UWF Replacement Forestry is one part of the Whole UWF Project, the cumulative impacts with the Other Elements of the Whole UWF Project are summarised below.

- The contribution of UWF Replacement Forestry to cumulative effects with the Other Elements will be barely noticeable. The cumulative effects of the Other Elements, to either Landscape Character or Visual Amenity, is expected to range from Imperceptible to Slight.

20.17.2 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 is expected to range from Imperceptible to 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 (currently under construction), and the existing Foilnahan Mast and existing Cummermore Communications Pole. Cumulative impacts to either Landscape Character or Visual Amenity will be Not Significant.

20.18 Summary of Chapter 18: Interaction of the Foregoing

Interaction of the Foregoing, or 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 Invasive Species 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 Chapter 5 of the EIAR Report.

The current List of environmental protection measures (below) will be updated post-consent, with any additional requirements of license conditions or statutory bodies.

Table 20-1: List of Environmental Protection Measures for UWF Replacement Forestry

Environmental Protection Measures	Source	Implemented By: Construction Manager/Project Manager Environmental Clerk of Works / Other
The Project Promoter is committed to implementing the Project Design Measures RF-PD01 to RF-PD15.	EIAR, Ch.5	Project Team and specialist environmental and engineering experts
The Project Promoter is committed to implementing the Invasive Species Management Plan .	Appendix A5.2	Project Team Site Ecologist
The Project Promoter is committed to implementing Best Practice Measures RF-BPM-01 to RF-BPM-03.	Appendix A5.1	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 planting stage, with some monitoring surveys continuing during the early operational stage (c. first 3 to 5 years of operation).

The Project Promoter will contractually oblige the construction contractors to carry out the works in accordance with the UWF Replacement Forestry environmental protection measures. This commitment will be monitored on the ground by a full time Environmental Clerk of Works and team of environmental experts as part of the Whole UWF Project monitoring and audit.

During the early growth stage monitoring and auditing 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 Replacement Forestry EIA Report

Ecopower Developments has submitted this EIA Report with an afforestation licence planning application for UWF Replacement Forestry to the Minister of the Department of Agriculture, Food and the Marine. Both the application and this EIA Report are available for on-line at www.upperchurchwindfarm.ie

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 Replacement Forestry 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 Replacement Forestry 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 infrastructure) 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 Replacement Forestry (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 Replacement Forestry, 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 planting and growth 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 Replacement Forestry is part of a whole project (Whole UWF Project), which also includes UWF Grid Connection, UWF Related Works, 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 Replacement Forestry can be developed, 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 Replacement Forestry either alone or in combination** with the Other Elements of the Whole UWF Project or with other existing or consented projects or activities.

Chapter	Executive Summary of the UWF Replacement Forestry EIA Report
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