UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 11: Water

HYDRO ENVIRONMENTAL SERVICES

ECOPOWER

October 2019

Contents

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Glossary of Terms

Term	Definition
Aquifer	A permeable geological stratum or formation that can both store and transmit water in significant quantities.
Baseflow	Water which enters streams/rivers from groundwater flow and maintains streamflow during dry periods.
Blanket Bog	Blanket bog is an area of peatland, forming where there is a climate of high rainfall and a low level of evapotranspiration, allowing decomposed organic material to accumulate over large expanses of undulating ground.
Biochemical Oxygen Demand	A measure of the amount of oxygen used in water by bacteria in the degradation of organic matter.
Electrical Conductivity	A measure of the ability of water to conduct an electrical current and is proportional to the concentration of irons in the solution.
Fluvial Flooding	Fluvial flooding occurs when rivers and streams break their banks and water flows out onto the adjacent low-lying areas (the natural floodplains).
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.
Pluvial Flooding	Pluvial flooding occurs when the amount of rainfall exceeds the capacity of urban storm water drainage systems or the ground to absorb it.
Recharge	Infiltration of rainfall into the local groundwater system.
Surface Water Runoff	Overland flow of water as a result of rainfall
Saturated Zone	The zone below the groundwater table in which all the soil pores and rock fractures are filled with water. It underlies the unsaturated zone (see below).
Spring	A flow of groundwater on the ground surface that occurs where the water table intercepts the ground surface.
Surface Water Catchment	The surface area determined by topographic features within which falling rain will contribute to run-off at a particular point under consideration.
Suspended Sediments	Particulate solids (i.e. sand, clay, silt, peat particles) entrained in surface water flow.
Unsaturated Zone	The zone below the land surface and above the groundwater table which contains water and air in the open spaces, or pores.

List of Abbreviations

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

Executive Summary of the Water Chapter

Baseline Environment: UWF Grid Connection is located within the Lower Shannon & Mulkear River hydrometric area and the River Suir hydrometric area, both of which contain Natura 2000 designated sites downstream of the development (i.e. Lower River Shannon SAC and Lower River Suir SAC respectively). Subcatchments include Kileengarrif_SC_010, Newport[Tipperary]_SC_010, Bilboa_SC_010 and Suir_SC_030. The Mountphilips Site and the majority of the 110kV UGC route exists (c.29km of the total 30.5km) within the Slieve Phelim Groundwater Body (GWB) with the far eastern section of the 110kV UGC route extending into the Templemore A GWB.

Survey Results for Sensitive Aspects in the Baseline Environment: The vast majority of the footprint of UWF Grid Connection is within the River Shannon (surface water catchment) i.e. Mountphilips Substation site and c.29km of the 110kV UGC. The remainder is located in the River Suir surface water catchment i.e. c.1.5km of the 110kV UGC route. There is a total of 68 No. watercourses within the construction works area boundary that require crossing. 63 of the watercourse crossing points are along the 110kV UGC route on the public roads, 3 are agricultural lands (Mountphilips Substation site) and the remaining 2 No. are on a private paved road (Consented UWF Substation site). 65 of the 68 watercourse crossings will take place at existing bridges (15) or culverts (50) on the public roads and the paved private road. Due to the primarily upland nature of the area, the majority of the watercourses intercepted are either drains or minor headwater streams. Replacement of the existing culverts may be required at upto 13 No. locations along the public road. Most of these 13 No. culverts are drains crossing under the regional road. Three larger watercourse crossings on the public road of note will occur, at bridges over the Newport River, the Clare River and the Bilboa River. These rivers will be crossed by installing the cable trench in the road over the bridge structures. Works to raise the road level and increase the height of parapet walls will be required at these 3 bridges.

All watercourse crossings along the construction route were mapped and characterised. Two rounds of water sampling were completed at nineteen of the watercourse crossings across the development site in January 2019 and twelve water samples were taken in June 2019. The results of the water sampling were consistent with EPA and Water Framework Directive values of typically 'Good to High' and 'Not at Risk.

Local water supplies were identified through fieldwork, door to door surveys and consultation with the local Newport Regional Water Supply office. There are private and public water supplies from surface water abstractions from local streams or rivers and from groundwater abstractions (wells) and springs. There are ten wells (including an old pump) downslope within 50m of the 110kV works boundary, and one well at 100m downslope. These include three Irish Water wells near the Newport Regional Water Supply plant.

Flood Risk Assessment: A flood risk assessment was conducted to identify potential flood risks associated with the proposed development. No instances of historical flooding were identified in historic OS maps and no instances of recurring flooding were identified on OPW Preliminary Flood Risk Assessment (PFRA) maps. The Mountphilips Substation site, is not located within a mapped fluvial flood zone. Due to the elevated nature of the majority of the 110kV UGC construction works areas, these areas are not located within PFRA mapped fluvial or pluvial flood extent zones and are considered to be at low risk to flooding. The PFRA mapping indicates that there are sections of the 110kV UGC route located in the fluvial Flood Zone A (100-year flood zone). The areas of mapped fluvial flood zones involve the larger stream and river crossings at eight places along the cable route, including one Joint Bay location, all on the public road. Cables and the one joint bay will be placed within the existing bridge structure and road. i.e. no instream works are required. Also, there will be no potential of increased local flood risk as a result of the proposed developments as the majority of the works are underground along the public road and the footprint of the over ground permanent infrastructure is minimal and outside of mapped flooding areas (Mountphilips

substation). Where existing culverts require replacement for the 110kV UGC, the hydraulic capacity of the culvert will be will be sized to cope with a minimum 100-year flood and will be at least 900mm in diameter.

Effects to water that were examined: This chapter examined the potential for construction stage effects to surface water quality from suspended solids in site runoff due to earthworks, excavations, storage of overburden, dewatering of excavations, and watercourse crossing works; effects to surface water quality due to contamination by fuels, oils, chemicals and cement based compounds; increased flood risk and suspended solids runoff during the operational stage due to new permanent crossing structures and new hardstanding areas at Mountphilips Substation site and replacement of culverts along the public road.

Project Design Measures: The UWF Grid Connection development as evaluated in the EIA Report incorporates Project Design Measures or mitigation measure to avoid, prevent or reduce negative impacts. There are thirty-four measures relevant to the protection of Water, which will prevent sedimentation release into watercourses, prevent contamination of surface water and groundwater, and avoid contributing to flood risk in the area. Protection of the water quality and the existing drainage regime will be managed under a Surface Water Management Plan (SWMP) which will be implemented through the UWF Grid Connection Environmental Management Plan by the appointed Contractor during the construction stage of the UWF Grid Connection. The implementation of the Surface Water Management Plan/Environmental Management Plan will be supervised and audited by a full time Environmental Clerk of Works who will be independent of the Contractor.

Summary of the Likely Impact to Local Surface Water Bodies (LSWB): The impact of the development is evaluated as **Imperceptible** because the vast majority of the watercourse crossing points for the development are at existing culverts along the public road network; the works will be distributed within four sub-catchments (i.e. impacts will not be concentrated within one sub catchment) across a large geographical area (latitudinal distance of 23km). The majority of the watercourses intercepted by the works area (74%) are drains or marginal headwater watercourses with low flows, and therefore the potential for these watercourses acting as a surface water flowpath to downstream watercourses is limited. Project Design Measures will control run-off and contamination. There will be temporal restrictions on instream works, culvert replacement works and at specified locations along the Regional Road R503. Only relatively small volumes of fuels / oils will be on-site at any one time and all fuels will be stored in the Temporary Compound at the Mountphilips Substation Site. Precast concrete structures only, will be used at joint bays and at culvert watercourse crossing locations. All new or replaced watercourse crossing structures will be designed to cope with a 100-year flood. The permanent hardstanding areas are limited to Mountphilips Substation site and will be negligible in scale in comparison to the area of the local surface water body. **Cumulative Impacts** with the Other Elements will **range from Imperceptible to Slight**, mainly due to the location of the majority of the UWF Grid Connection in the River Shannon catchment, and the location of the majority of the Upperchurch Windfarm/UWF Related Works in the River Suir catchment. Cumulative Impacts with Other Projects (consented Newport Town Park, consented/potential Castlewaller Windfarm and potential Bunkimalta Windfarm) will be Slight adverse, in part due to the large size of the surface water catchment area and the transient nature of the UWF Grid Connection works.

Summary of the Likely Impact to Ground Water Bodies (GWB): Effects on groundwater quality is evaluated as **Imperceptible** because the use of fuel, oil and chemicals will be negligible and storage of same will be controlled by virtue of project design. Relatively small volumes will be required at Mountphilips Substation. Very small amounts of cement are required per metre of trench (~0.4m^3) for the 110kV UGC, the total volume of semi-dry lean-mix cement placed within local groundwater catchments for UWF Grid Connection will be small. Effects on groundwater levels or flows are not likely to occur due to the shallow nature of the substation excavations and of the cable trench / joint bays in the public road. Cumulative impacts with Other Elements of the Whole UWF Project will be **Imperceptible** due to the shallow nature of excavations,

very small volumes of cementious material for UWF Related Works and the implementation of Concrete Controls as part of the Upperchurch Windfarm works.

No Likely Impact to Local Wells and Springs due to the location of construction works, plant and machinery in/on hardcore/paved road surfaces, the small number of local wells and springs with water supply mainly through public water mains, the use of wet cement will be limited to the trench with imperceptible impacts to the underlying groundwater or local surface water expected.

Summary of the Likely Impacts to the Lower River Shannon SAC: The 110kV UGC passes within the boundary of the Lower River Shannon SAC, at six locations (all within the Mulkear River catchment). The impact on the SAC of the development is evaluated as **Imperceptible** because the working footprint will be spread out over a large geographical area within the Mulkear River catchment, all excavated material from public roads will be removed to licensed waste facilities; the majority of the watercourses intercepted by the works area (74%) are drains or marginal headwater watercourses with 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; all works within the SAC will be confined to public road surface, and where works traversing the Rockvale Bridge and Anglesey Bridge, works will be confined to the bridge. Project Design Measures for works within the SAC, include that works in the SAC boundary will take place during dry weather; no chute washout within the boundary of the SAC; a row of silt fencing will be placed along the edge of the public road to capture any site runoff which will then be treated prior to discharge; there will be no direct discharge of pumped water into any watercourse or drain; and works within the boundary of the SAC will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice Measures are followed. **Cumulative Impacts** with the Other Elements will be **Imperceptible**, mainly due to the location of the majority of the UWF Grid Connection in the River Shannon catchment, and the location of the majority of the Upperchurch Windfarm/UWF Related Works in the River Suir catchment. Cumulative Impacts with Other Projects (consented Newport Town Park, consented/potential Castlewaller Windfarm and potential Bunkimalta Windfarm) will be **Imperceptible**, in part due to the large size of the Mulkear River catchment area and the transient nature of the UWF Grid Connection works which will predominately take place place on public roads.

Summary of the Likely Impacts to the River Suir SAC: The 110kV will be located c.12km upstream of the River Suir SAC. The 110kV UGC will cross five watercourses at existing crossing points (all culverts) along paved road in the Suir sub-catchment. Four out of the five watercourses to be crossed are drains with no fisheries value. The existing culvert at 1 No. drain along the public road may potentially require replacement during construction works. The impact is evaluated as **Imperceptible** due to the small scale of the works in the River Suir catchment and the large downstream distance to the SAC. **Cumulative impacts** with the Other Elements will also be **imperceptible** due to the location of the majority of the UWF Grid Connection in the River Shannon catchment, and the location of the majority of the Upperchurch Windfarm/UWF Related Works in the River Suir catchment, and the separation distance between works and the SAC.

Summary of the Significance of the Potential Impacts to Local Water Dependant Habitat: Impacts are **No Likely Impact** due to the absence of suitable marsh fritillary habitat on or adjacent to, construction works areas for UWF Grid Connection. The impact of the whole project is evaluated as **Slight**.

Conclusion: The UWF Grid Connection will not cause significant adverse effects to Water

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

Ireland is divided into 40 hydrometric areas. Each Hydrometric Area comprises a single large river basin, or a group of smaller ones, and neighbouring coastal areas. The catchment of the River Shannon and its tributaries which, because of its size, was divided into two hydrometric areas, 25 (Lower Shannon) and 26 (Upper Shannon). With respect of surface water, the existing environment comprises local and regional and surface water bodies within the Lower Shannon & Mulkear and the River Suir hydrometric areas see Figure GC 11.1.1 Location of the UWF Grid Connection – Hydrometric Areas.

An overview of the regional hydrology is shown in the table below, and illustrated on Figure GC 11.1.2: Location of the UWF Grid Connection – Sub-Catchments and Local Surface Water Bodies (sub-basins).

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

Hydrometric Area	Sub-Catchment	Local Surface Water Body (Sub-basin)
Lower Shannon & Mulkear hydrometric area	Newport (Tipperary)_SC_010	Newport_040
	Killeengarriff_SC_010	Ballyard_010
		Annagh(Tipperary)_030
		Annagh(Tipperary)_020
	Bilboa_SC_010	Bilboa_010
		Inch (Bilboa)_010
River Suir hydrometric area	Suir_SC_030	Clodiagh (Tipperary)_010

The Lower Shannon & Mulkear and River Suir hydrometric areas both contain Natura 2000 designated sites downstream of the development (i.e. Lower River Shannon SAC and Lower River Suir SAC respectively).

In respect of groundwater, the existing environment comprises 2 no. local groundwater bodies (GWBs) - the Slieve Phelim GWB and the Templemore A GWB. Both GWBs mainly comprise 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.

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 (inclusive of local watercourses that intercept the development)	Section 11.2
Sensitive Aspect No. 2	Local Groundwater Bodies	Section 11.3
Sensitive Aspect No. 3	Local Wells & Springs	Section 11.4
Sensitive Aspect No.4	Lower River Shannon SAC	Section 11.5
Sensitive Aspect No.5	Lower River Suir SAC	Section 11.6
Sensitive Aspect No.6	Local Water Dependent Habitats	Section 11.7

Each of the above listed Sensitive Aspects are evaluated individually in Sections 11.2 to 11.7 of this Chapter.

To help readers navigate to individual sensitive aspect sections, the colour codes for each Sensitive Aspect used above are also used in the Sensitive Aspect sections Section 11.2 to 11.7. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

11.1.4 Sensitive Aspects excluded from further evaluation

The following Sensitive Aspects are excluded from this topic chapter:

Mauherslieve Bog NHA	Evaluated as having no potential for effects due to: **No likely impacts** Mauherslieve Bog NHA is an upland blanket bog located in separate local surface water bodies upstream of the development, on high ground approximately c.3.6km upstream of the UWF Grid Connection (where the 110kV UGC is routed along the Regional Road R503 through Rear Cross village). The Other Elements (Upperchurch Windfarm, UWF Related Works and UWF Replacement Forestry) are located much further to the east, and in different local surface water catchments. Due to the location in separate upstream local surface water bodies, large down-gradient distance to UWF Grid Connection and the nature of the excavation works (i.e. shallow trench in public road pavement) no hydrological impacts on Mauherslieve Bog NHA are expected.
Bleanbeg Bog NHA	**Evaluated as having no potential for effects due to: No likely impacts** Bleanbeg Bog NHA is an upland blanket bog, located in separate local surface water bodies upstream of the development, on high ground approximately c.6.8km upstream of the of the UWF Grid Connection (where the 110kV UGC is routed along the Regional Road R503 at Lackamore). The Other Elements (Upperchurch Windfarm, UWF Related Works and UWF Replacement Forestry) are located much further to the east, and in different local surface water catchments. Due to the location in separate upstream local surface water bodies, the large down-gradient distance to UWF Grid Connection and the nature of the excavation works (i.e. shallow trench in public road pavement) no hydrological impacts on Bleanbeg Bog NHA are expected.
Grageen Fen and Bog NHA	**Evaluated as having no potential for effects due to: No potential for impacts** Grageen Fen and Bog NHA is an upland blanket bog and alkaline fen located in a separate local surface water body (the Mulkear (Limerick)_030), approximately c.3.2km south of the UWF Grid Connection (where the 110kV UGC is routed along the Regional Road R503 at Lackamore). The Other Elements (Upperchurch Windfarm, UWF Related Works and UWF Replacement Forestry) are located much further to the

	east, and in different local surface water catchments. Due to the large down-gradient distance to UWF Grid Connection and its location in a separate local surface water body, there is no potential for hydrological impacts on Grageen Fen and Bog NHA.
Clare Glen SAC	Evaluated as having no potential for effects due to: Clare Glen SAC is located in a wooded area on both banks of the Clare River approximately c.2.2km downstream of the UWF Grid Connection (110kV UGC) within the Annagh (Tipperary)_030 local surface water body. The qualifying interests, which includes Old Oak Woodlands and Killarney Fern, are terrestrial habitats, rather than water or watercourse based habitats. Regardless, with the implementation of the project design measures, any effects to water quality within the downstream SAC will be imperceptible of less. The UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm and UWF Other Activities are not located within the Annagh (Tipperary)_030 local surface water body catchment therefore there is no potential for effects by these Elements.
Surface Water abstraction for Newport Regional Water Supply	Evaluated as having **no potential for or likely effects** due: The surface water source for the Regional Supply is abstracted from the Newport River, c.370m upstream of Rockvale Bridge (UWF Grid Connection watercourse crossing point W7). The installation of the 110kV UGC in the public road over the Rockvale Bridge will not cause any impacts to this supply, due to the location of works downstream of the abstraction point. The potential for effects to the groundwater source for the Newport Regional Water Supply is evaluated in Section 11.4. The potential for effects to underground pipes for the Newport Regional Water Supply is evaluated in Chapter 14: Material Assets (Built Services).
Other Surface Water Abstractions (Public / private water abstractions from local stream or rivers)	Evaluated as having no likely effects due to: No other surface water abstractions within 100m of UWF Grid Connection construction works were identified during desktop or field surveys, during door to door surveys or by the public consultations meetings. Notwithstanding this, the Project Design and Project Design Measures described in this chapter, the Surface Water Management Plan appended to this EIA Report in the UWF Grid Connection Environmental Management Plan, and the related Best Practice Measures 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 Grid Connection is the subject development, being the subject of the current application to An Bord Pleanála. The main parts of the UWF Grid Connection are identified in Table 11-1 below.

Table 11-1: Subject Development – UWF Grid Connection

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

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

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

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

11.1.5.1 Changes to the development from the 2018 Application

This is the 2nd Application for UWF Grid Connection (2019 Application). The previous application (2018 Application) was refused by An Bord Pleanála in December 2018. There are changes in this 2019 UWF Grid Connection Application from the 2018 Application. These comprise;

- In this 2019 Application, the route of the 110kV UGC from Mountphilips Substation Site entrance to the Consented UWF Substation site is wholly under the public road (except for 700m under a private paved road at the Consented UWF Substation end) and is 30.5km in length. By comparison, the 2018 Application 110kV UGC route was through agricultural and forestry tracks and lands with some public road crossings and 27.5km in length.
- Mountphilips Substation is at the same location, but the footprint of the Substation Compound is increased by 15% (from 8930m^2 to 10290m^2) and the footprint of the control building is increased from 205m^2 to 375m^2. ***Note***: Details of the changes/no changes to the Mountphilips Substation Site as a result of the increased dimensions are listed in Chapter 5: Description of the Development: Section 5.1.1.1.

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 used to gather information on the baseline environment and evaluate impacts, including cumulative impacts. The recommendations in the guidelines listed in the table, have been considered during the preparation of this chapter.

Table 11-2: Sources of Baseline Information for Water

Type	Source
Consultation	Feedback was received from • Inland Fisheries Ireland • Health Services Executive • Irish Water • Office of Public Works • National Federation of Group Water Schemes • Members of the public during door-to-door survey and the Public Consultation and Information Day See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.
Legislation, Regulations, & Policy	• EU Water Framework Directive (WFD) (2000/60/EC) • European Communities (Water Policy) Regulations, 2003; • European Communities (Surface Waters) Regulations, 2009; • 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. • International River Basin Management Plans second cycle 2018 – 2021
Industry Guidance	• Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements; • National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes; • Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes • Wind Farm Development Guidelines for Planning Authorities (2006); • Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh; • Coillte (2009): Forest Operations & Water Protection Guidelines; • Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford; • UK Pollution Prevention Guidelines (PPG) PPG1 - General Guide to Prevention of Pollution and PPG5 – Works or Maintenance in or Near Watercourses; • CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); • CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006; • Inland Fisheries Ireland 2016: Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters; • DoELG, EPA, and GSI (1999): Groundwater Protection Schemes. Department of the Envi-

Type	Source
	ronment and Local Government (DOELG), Environmental Protection Agency (EPA) and the Geological Survey of Ireland (GSI); • EPA Drinking Water Advice Note No. 7: Source Protection and Catchment Management to Protect Groundwater Supplies; • EPA Drinking Water Advice Note No. 8: Developing Drinking Water Safety Plans; and, • EPA Drinking Water Advice Note no. 14: Borehole Construction and Wellhead Protection
Desktop	• Environmental Protection Agency (www.catchments.ie) • Environmental Protection Agency database and Hydrotool Map Viewer (www.epa.ie); • Geological Survey of Ireland Databases (www.gsi.ie); • Met Eireann Meteorological Databases (www.met.ie); • National Parks & Wildlife Services Public Map Viewer (www.npws.ie); • Water Framework Directive "WaterMaps" Map Viewer (www.wfdireland.ie); • OPW Indicative Flood Maps (www.floodmaps.ie); • CFRAM Flood Risk Assessment maps (www.cfram.ie); • Department of Environment, Community and Local Government (www.myplan.ie); and, • Pre-surveyed dwelling house locations as an indicator of potential local groundwater supplies (i.e. wells). • Review of EIAR Chapter 10: Soil, Chapter 8: Biodiversity • Review of planning/ environmental information documents for the Other Elements of the Whole UWF Project as contained in Volume F of the planning application; • Review of environmental information/planning documents for Castlewaller Windfarm (consented windfarm and potential grid connection), Bunkimalta Windfarm (consented grid connection and potential windfarm based on previously proposed windfarm), and the consented Newport Town Park.
Fieldwork	• Walkover survey and hydrological mapping of the UWF Grid Connection Mountphilips Substation Site and route of 110kV UGC was undertaken; • Mapping and characterisation of all watercourse crossings along the construction works areas; • Inventory and Survey of Watercourse Crossings; (refer to Appendix 11.1) • Surface water sampling (a total of 57 no. samples were taken at 32 no. sampling locations along the UWF Grid Connection route); (refer to Appendix 11.2) • Identification of local water supplies along the works area through door to door surveys; • A site specific Flood Risk Assessment (Stage II) for UWF Grid Connection (refer to Appendix 11.3).

11.1.8 Methodology for Evaluating Effects

The criteria used for evaluation of Local Surface Water Bodies was based on the NRA (2008) guidance which is also an approach that was referenced by the Institute of Geologists Ireland (IGI) guidance (2013).

11.1.8.1 NRA Criteria for Estimating the Importance of Hydrology Attributes

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

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

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on international scale.	River, wetland or surface water body ecosystem protected by EU legislation, e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale.	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.	Salmon fishery Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale.	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes. Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

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

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

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

The magnitude of the impact is evaluated using the NRA (2008) criteria outlined Table 11-5 and Table 11-6.

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

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

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

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

Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Calculated risk of serious pollution incident <0.5% annually.

Table 11-7: Rating of Environmental impact at EIAR Stage (NRA, 2008)

Importance of Tribute	**Magnitude of Impact**			
	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

11.1.8.3 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 body, for example, Killleengarrif_SC_010, then Newport (Tipperary)_SC_010 sub-catchments as required.

11.1.8.4 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 NFGWS[1] (NFGWS had no records of group water schemes in the area);
- Door to door survey of dwellings within 50m of construction works areas;

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 or with Other Elements of the Whole UWF Project, 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

11.1.9 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, data and documents generated by public bodies and statutory agencies. The online baseline data was verified in the field.

The criteria used for water (hydrology and hydrogeology) appraisals are derived from the National Roads Authority (2008) guidance document. All documentation used is referenced at the end of the chapter. In respect of Water, no significant limitations of difficulties were encountered

It should be noted that the EPA and www.catchments.ie database names for Rivers/Waterbodies, River Sub Basins and Catchments have been used in this Chapter, and differ in some instances to those names used in the 2013, 2018 and 2019 planning documents for Other Elements of the Whole UWF Project, which used the WFD database, correct at that time. For ease of cross referencing to the 2013 EIS and 2013 RFI for Upperchurch Windfarm, and the 2018 EIAR for UWF Replacement Forestry, and the 2019 Revised EIAR for UWF Related Works (currently under appeal to An Bord Pleanála):

Name under WFD database *(used for 2013 Upperchurch Windfarm, 2018 UWF Replacement Forestry and 2019 UWF Related Works reports)*	**Name under EPA Database (used for this current EIAR)**
Newport River catchment	Newport_SC_010 sub-catchment
Clare River catchment	Kileengariff_SC_010 sub-catchment
Bilboa River catchment	Bilboa_SC_010 sub-catchment
Clodiagh River catchment	Suir_SC_030 sub-catchment
Kilcomenty, Trib of Mulkear - IE_SH_25_1981	Ballyard_010
Newport, Trib of Mulkear - IE_SH_25_320	Newport_040
Small, Trib of Mulkear - IE_SH_25_2323	Annagh(Tipperary)_030
Annagh, Trib of Mulkear - IE_SH_25_2029	Annagh(Tipperary)_020
Abington, Trib of Mulkear - IE_SH_25_2521	Bilboa_010
Abington, Trib of Mulkear - IE_SH_25_1924	Inch (Bilboa)_010
ClodiaghUpper, Trib of SuirClodiagh - IE_SE_16_3320	Clodiagh (Tipperary)_010

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 (which includes the actual surface watercourses which intercept the development) in relation to the UWF Grid Connection is described in Table 11-8 and illustrated on Figure GC 11.2.1 to GC 11.2.4: UWF Grid Connection Study Area for Local Surface Water Bodies (Volume C3 EIAR Figures).

Table 11-8: UWF Grid Connection Study Area for Local Surface Water Bodies

Study Area for Local Surface Water Bodies	Justification for the Study Area Extents
Local surface waterbody catchments within which the UWF Grid Connection is located	Defined by local topography, flow patterns and drainage as defined by the EPA mapping on www.catchments.ie

11.2.1.2 Baseline Context and Character of Local Surface Water Bodies in the UWF Grid Connection Study Area

11.2.1.2.1 Regional and Local Hydrology

The majority of the footprint of the UWF Grid Connection is located within the River Shannon (surface water catchment, with the remainder located in the River Suir surface water catchment. Within the River Shannon catchment, the Mountphilips Substation site and c.29km of the 110kV UGC exist within the Lower Shannon & Mulkear hydrometric area (HA25D). The sub-catchments within the Lower Shannon & Mulkear hydrometric area include, (listed from west to east) the Killeengarriff_SC_010, Newport (Tipperary)_SC_010 and the Bilboa_SC_010. Within the River Suir catchment, the remaining c.1.5km of the 110kV UGC route is located within the Suir_SC_030 sub catchment. These sub catchments are further divided into river sub basins as tabulated in Ttable 11-8 and seen on Figure GC 11.2.1 to GC 11.2.4.

There is a total of 68 no. watercourses within the construction works area boundary associated with the UWF Grid Connection, 3 no. of these are at the Mountphilips Substation site (2 no. of these watercourses are new crossings located along the new access road to Mountphilips Substation, 1 no. temporary watercourse crossing between Mountphilips and the End Masts). 63 no. watercourse crossings are located along the route of the 110kV UGC on the public road network (road numbers: L2166-10, L6013-0, L2156-0, L2157-0, L6009-0, R503, L2264-50 and L6188-0) and the remaining 2 no. are located along the private paved road close to the Consented UWF Substation on the eastern extremity of the 110kV UGC route.

Due to the primarily upland nature of the study area, the majority of the watercourses intercepted by the UWF Grid Connection are either drains or minor headwater (1st - 2nd order) streams. Three larger watercourse crossings of note will occur, these watercourses include

- the Newport River at Rockvale Bridge (W7) on the L2156-0 north of Newport town;
- the Clare River at Tooreenbrien Bridge (W36) on the R503 near Lackamore; and
- the Bilboa River at Anglesey Bridge (W53) on the R503 near Kilcommon.

These rivers will be crossed by installing the trench in the road over the bridges.

A summary of regional and local surface water bodies as defined by the EPA GIS Mapping that the UWF Grid Connection passes through and the number of watercourse crossings required in each surface water body are shown on Table 11-9 below. Mountphilips Substation is located in the Ballyard_010 catchment, which is within the Killeengarrif_SC_010 sub catchment. The Ballyard_010 catchment drains into the Newport River (at a point below Newport town) c. 6km downstream of the Mountphilips Substation site. The occurrence of the 110kV UGC, instream works, potential culvert replacement works and joint bays, are also identified for each surface water body in Table 11-9.

Table 11-9: Summary of Regional Hydrology, Local Hydrology and Proposed Infrastructure along the UWF Grid Connection (110kV UGC)

Hydrometric Area	EPA Sub-Catchments[1]	EPA - Local Surface Water Bodies[2]	Length of 110kV UGC (km)	No. Water-course Crossings	Potential Culvert Replace-ment Works[3]	Instream Works	No. Joint Bays
Lower Shannon and Mulkear	Killeengarriff_SC_010	Ballyard_010	1.3	4	0	3 (at Mountphilips Substation site)	1
	Newport (Tipperary)_SC_010	Newport_040	3.5	5	0	0	6
	Killeengarriff_SC_010	Annagh(Tipperary)_030	4	7	0	0	5
		Annagh(Tipperary)_020	8.4	23	8	0	11
	Bilboa_SC_010	Bilboa_010	6.4	18	2	0	10
		Inch (Bilboa)_010	5.4	6	2	0	7
Suir	Suir_SC_030	Clodiagh (Tipperary)_010	1.5	5	1	0	2

[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 https://gis.epa.ie/EPAMaps/

[3]Potential culvert replacement at W13, W14, W15, W17, W19, W20, W32, W34, W55, W57, W60, W61 and W64. While these works will include instream works to some degree, they are called 'Culvert Replacement Works' throughout the EIA Report to distinguish them from the works at W1, W2 and W3 at Mountphilips Substation site. The works at W1, W2 and W3 are referred to as 'instream works' throughout.

11.2.1.2.2 Existing Water Quality Monitoring Data and WFD Waterbody Status

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. A summary of the EPA Values (Biotic Index) for surface water within the study area of the UWF Grid Connection are shown in Table 11-10. A Q-Value is generally only available for the main rivers and streams downstream of the works area. 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.

The EPA and Water Framework Directive "Status" and "Risk Result" for surface water bodies in the area of the UWF Grid Connection are shown in Table 11-11. The status of the surface water bodies at the study area is typically Good. The majority of the SWBs are *Not at Risk* with the exception of the Inch (Bilboa)_010 and Clodiagh (Tipperary)_010 which are reported to be At Risk of morphological and forestry related effects such as suspended sediment and eutrophication.

Table 11-10: Summary of EPA Q-Values for Surface Water Bodies in the UWF Grid Connection Study Area

EPA Watercourse	EPA Location Description	Easting / Northing	EPA Q Status
Newport River	Bridge downstream of Annagh Bridge	E168236 , N156331	Good
Newport River	Bridge south of Shower	E170270 , N161830	High
Newport River	Rockvale Bridge	E173860 , N163330	High
Small River	Upstream of Newport River confluence	E174250 , N162570	Good
Tooreenbrien Stream	Tooreenbrien Bridge	E181444 , N160200	Good
Clare River	Bridge u/s of Inchinmathea Bridge	E184950 , N162060	Good
Tributary of Bilboa River	Bridge in Kilcommon	E190280 , N159990	Good
Tributary of Bilboa River	Bridge u/s of Bilboa Confluence	E188903 , N158321	Good
Tributary of Bilboa River	Bridge SE of Loughbrack	E191722 , N158507	Moderate
Clodaigh River	Bridge North of Castlehill	E198165 , N165026	High
Clodaigh River	Bridge East of Rathcarden	E202314 , N163807	Good

11.2.1.2.3 EPA WFD Waterbody Status and Risk Result

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

The status of the surface water bodies at the study area is typically Good. The majority of the SWBs are *Not at Risk* with the exception of the Inch (Bilboa)_010 and Clodiagh (Tipperary)_010 which are reported to be At Risk of not meeting the Water Framework Directive objectives due to morphological and forestry related effects such as suspended sediment and eutrophication.

Table 11-11: EPA WFD Waterbody Status and Risk Result

Regional Catchment	EPA Sub-Catchments	EPA - Local Surface Water Bodies[2]	WFD Status	WFD Risk Results
Shannon	Killeengarriff_SC_010	Ballyard_010	Good	Not at risk
	Newport (Tipperary)_SC_010	Newport_040	Good	Not at risk
	Killeengarriff_SC_010	Annagh (Tipperary)_030	Good	Not at risk
		Annagh (Tipperary)_020	Good	Not at risk
	Bilboa_SC_010	Bilboa_010	Good	Review*
		Inch (Bilboa)_010	Moderate	At risk
Suir	Suir_SC_030	Clodiagh (Tipperary)_010	Good	At risk

* Water bodies for Review are not considered to be At Risk, but require further evidence that the objectives are being met, typically with ongoing monitoring and/or possibly modelling. Water bodies characterised as Review as the degree of confidence in the characterisation is weak

11.2.1.2.4 Results of Surface Water Sampling

Due to the lack of existing water quality data/biotic data for the majority of the watercourses at the works areas, 2 no. round of surface water sampling were completed at 19 no. of the larger Class 1 / Class 2 watercourse crossings along the UWF Grid Connection route in January and June 2019. In addition, 7 no. samples (DSW1 – DSW7) were taken further downstream of the development in the Killeengarriff_SC_010 and Bilboa_SC_010 sub-catchments. This survey data is presented in Appendix 11.2 Surface Water Sampling Results.

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

11.2.1.2.5 Classification of Watercourses at Crossing Locations

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 Inventory and Survey of Watercourse Crossings, 65 of the 68 no. watercourse crossings are existing culverts/bridges. Most of the larger watercourse crossings consist of bridges, with culverts typically used on smaller watercourse crossings.

Based on the field surveys, the watercourses are categorised Class 1 (highest fisheries value) to Class 4 (no fisheries value) as shown in Table 11-12

Shown in Table 11-12 below is a summary classification of the watercourses which will be crossed by the 110kV UGC route. A large proportion of the watercourses at the crossing locations are Drains (~40%, Class 4). Approximately ~20% of the watercourses are natural streams with potentially good fisheries value (Class 1 and Class 2).

Table 11-12: Summary Watercourse Characterisation at the 110kV UGC Crossing Locations

Class	Watercourse Description	Total No.	Total with potential Culvert Replacement Works	Total In-stream Works
1	EPA mapped blue line, major river or stream (fisheries value)	13	1	0
2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	3	0	2
3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	27	3	1
4	Drain (no fisheries value)	25	9	0
	Total	**68**	**13**	**3**

11.2.1.2.6 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 and this report is attached as Appendix 11.3 Flood Risk Assessment. A summary of the flood risk assessment is provided below.

The primary objective of the Flood Risk Assessment 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 – such as the new permanent access road to the Mountphilips Substation. The potential impacts of the development on flooding were also assessed.

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 flood zones, being located within fluvial Flood Zone C (Low Risk). In addition the majority of construction works areas are not located within any pluvial flood extent zones. It is therefore considered that the location of the UWF Grid Connection is at low risk to flooding.

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.

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 W5, W7 (Newport River), W8, W9 (Small River), W33, W36 (Clare River), W39, W49 and W53 (Bilboa River). Access to these crossing locations will only be required during the construction stage (no new permanent infrastructure is required at these watercourses crossing locations). The Mountphilips Substation site is also not located within a mapped fluvial flood zone.

11.2.1.3 Importance of Local Surface Water Bodies

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

However, as described above, the majority of the watercourses at construction works areas associated with the UWF Grid Connection are located within the public road and 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.

Overall, Local Surface Water Bodies are evaluated as having **High** importance.

11.2.1.4 Sensitivity of Local Surface Water Bodies

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

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

Based on the EPA database, 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 (Tipperary)_010, based on the WFD surface waterbody reports (www.wfdireland.ie), the Suir Regional catchment waterbodies in the study areas are reported to be **Not at Risk** from water quality impacts (diffuse and point source) or morphological impacts. The Clodiagh (Tipperary)_010 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.

It is noted that the status and risk characterisations have not been updated in the current RBMP (2018-2021), thus characterisation and water quality status are cited as indicative

11.2.1.6 Receiving Environment (the Baseline + Trends)

Due to the slow rate of change, it is expected that the status of waterbodies will be the same at the time of construction (2020/2021). However, 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.

11.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.2.2.1 Cumulative Evaluation Study Areas

11.2.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

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

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

The study is illustrated on Figure CE 11.2 UWF Grid Connection Cumulative Evaluation Study Area for Local Surface Water Bodies

11.2.2.1.2 Whole Project Cumulative Evaluation Study Area

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

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

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 11.2.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 11-13 and illustrated on Figure WP 11.2 Whole Project Study Area for Local Surface Water Bodies

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

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

11.2.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Local Surface Water Bodies also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Local Surface Water Bodies with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.18).

The results of this scoping exercise are that: Newport Town Park, Castlewaller Windfarm, and Bunkimalta Windfarm have been scoped in for evaluation of cumulative effects to Local Surface Water Bodies.

11.2.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Local Surface Water Bodies

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Local Surface Water Bodies. The results of this evaluation are included in Table 11-14.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure WP 11.2 (Volume C3 EIAR Figures). The baseline character of the areas around these Elements is described in Section 10.2.2.3.

Table 11-14: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Elements of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral effect/No potential for effects due to: The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no hydrological / water quality effects are likely. Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore neutral surface water impacts are expected. Monitoring Activities do not require any major construction activities. Therefore, neutral surface water impacts are expected. Once off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality. During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore no impacts are expected.
Other Project or Activity	
Consented Newport Town Park	Yes, included for the evaluation of cumulative sedimentation effects.

Castlewaller Windfarm *(consented windfarm and potential grid connection)* Potential Bunkimalta Windfarm *(potential windfarm and consented grid connection)*	Evaluated as excluded: cumulative impacts in relation to fuel/oil or cementious material contamination, increased flood risk or runoff from permanent surfaces: Neutral cumulative water quality effects due to oils/cement contamination, as it is expected/planned to develop these projects using best practice oil, fuel and cement measures. No cumulative morphological impacts due to separation distance from UWF Grid Connection. Cumulative increases in flood risk due to the Other Projects are not expected due to the upland locations of consented Castlewaller Windfarm and potential Bunkimalta Windfarm (i.e. in low risk flood zones), the location of all Other Projects outside of the Ballyard_010 catchment where watercourse crossing works and new hardstanding areas for Mountphilips Substation site are proposed for UWF Grid Connection; the sizing of replaced/new watercourse structures for UWF Grid Connection to cope with a minimum 100-year flood event, the absence of any changes to watercourse crossing structures and the absence of any new watercourse crossing structures in the Newport (Tipperary) SC_010 (where all Other Projects are located). Cumulative impacts to water quality due to surface water runoff from hardstanding areas will be neutral due to assimilative capacity and dilution factors within the large sub catchment areas.

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 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 (Tipperary)_010catchment, c 3.8km within the Owenbeg_010 catchment and c 0.8km within the Multeen (East)_010 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 11-15 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 11-15.

Table 11-15: Summary of Regional and Local Hydrology at the UWF Related Works Areas

HW – Haul Route Works, RWR – Realigned Windfarm Roads

Regional Catchment	EPA sub-catchment	EPA Local Surface Water Bodies	Internal Cable (km)	HW works	RWR works	No. WC Crossings
Suir	Multeen[East]_SC_010	Multeen (East)_010	0.88	-	-	0
	Suir_SC_030	Clodiagh (Tipperary)_010	11.44	HW1 to HW6 HW11 – HW13	RWR1-RWR2	26
	Suir_SC_030	Owenbeg_010	3.84	-	RW3	5

Shannon	Bilboa_SC_010	Inch (Bilboa)_010	1.45	HW7 to HW10	-	1
		Bilboa_010	0.29	-	-	0

As shown in Table 11-15 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 (Tipperary)_010 surface water body (26 no. of 32 no. crossings). There is only 1 no. watercourse crossing in the River Shannon catchment. Refer to Table 11-15 above for the distribution of the watercourse crossings within the local surface water bodies.

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 11-17. A Q-Value is generally only available for the main rivers and streams downstream of the works area.

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

Table 11-16: Summary of Q-Values for Surface water Bodies in the UWF Related Works Study Area (EPA)

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

The Water Framework Directive "Status" for surface water bodies in the area of the UWF Related Works are typically Good. The majority of the SWBs are Not at Risk of achieving Good Status with the exception of the Clodiagh (Tipperary)_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 Points

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 11-18 below is a summary classification of the watercourses which will be crossed by the UWF Related Works. 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 (~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 11-17: Characterisation of Watercourse Crossings at the UWF Related Works areas

Class	Watercourse Description	Total No.	Total With In-Stream Works
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

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.

Flood Risk Assessment

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.

11.2.2.3.2 Element 3: UWF Replacement Forestry

All of the UWF Replacement Forestry is located within the Clodiagh (Tipperary)_010 catchment, 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 EPA Waterbody Status

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

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

Table 11-18: Summary of Q-Values for Surface water Bodies in the UWF Replacement Forestry Study Area (EPA)

EPA Watercourse	EPA Location Description	Easting / Northing	EPA Q Status

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

The Water Framework Directive "Status" for surface water bodies in the area of the UWF Replacement Forestry are shown in Table 11-19. The status of the surface water bodies at the study area is typically Good. The Clodiagh (Tipperary)_010 is reported to be At Risk of morphological and forestry related effects such as suspended sediment and eutrophication.

Watercourse Crossing Points

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

Results of Surface Water Sampling

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

Flood Risk Assessment

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

11.2.2.3.3 Element 4: Upperchurch Windfarm

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

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

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

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

Consideration of the Passage of Time: A comparison of water quality sampling results and EPA monitoring data used for the 2013 EIS compared to the 2019 Revised EIAR for UWF Related Works data demonstrates that water quality in the windfarm area has improved slightly, with an improvement of Good to High in the Suir Clodiagh catchment, and Poor/Moderate to Moderate in the Bilboa catchment, this change is not considered to be material in the context of the assessments, and therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this 2019 UWF Grid Connection EIA Report.

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

Newport Town Park (consented): A public park in Newport town is consented by Tipperary County Council, which is also located in the Newport (Tipperary)_SC_010 sub-catchment, and downstream of the UWF Grid Connection development. The park includes excavations, groundworks. Landscaping and car-parking facilities on lands immediately adjacent to the Newport River and overlaps the boundary of the Lower River Shannon SAC. No instream works associated with the Newport Town Park project.

Castlewaller Windfarm (consented): The 16 no. turbines and 1 no. substation of this consented windfarm development are all located within the Newport (Tipperary)_SC_010 sub-catchment, all upstream of the UWF Grid Connection development. The route of the associated potential grid connection is assumed in this report to be predominately within the public road corridor to Killonan Station and is also within the River Shannon Catchment, The potential grid connection route may overlap with the UWF Grid Connection along the public road L6009-0. Although it is not likely that Castlewaller Windfarm or its grid connection will be constructed during the same period as UWF Grid Connection, this Other Project is nonetheless included in the cumulative evaluation on a precautionary basis and the potential for windfarm construction works taking place during the same period as UWF Grid Connection works is evaluated. The construction of the consented windfarm will involve both instream works and works in close proximity to watercourses.

Bunkimalta Windfarm (potential): Although it is not expected that the Bunkimalta Windfarm will be constructed at the same time as Upperchurch Windfarm or UWF Grid Connection (due to the recent annulment of the Bunkimalta Windfarm planning permission following the European Court of Justice ruling C-164/17), this project and its associated gird connection are nonetheless included in the cumulative evaluation on a precautionary basis. The potential Bunkimalta Windfarm is expected to be located in the same general area, upstream of the UWF Grid Connection only. The Bunkimalta Windfarm is assumed in this report to be similar to the previous application for 16 no. turbines and a substation compound. The turbines are assumed to be located within both the Kileengarrif_SC_010 sub-catchment and the Newport (Tipperary)_SC_010 sub-catchment. The construction of the windfarm is assumed to involve both instream works and works in close proximity to watercourses. The grid connection (consented) associated with the potential Bunkimalta is predominately within the public road corridor to Nenagh town and is also within the River Shannon Catchment, though does is not located close to the UWF Grid Connection.

11.2.3 PROJECT DESIGN MEASURES for Local Surface Water Bodies

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

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

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

The Project Design Measures outlined in Table 11-20 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect **Local Surface Water Bodies**.

Please Note: The Project Design Measures will be implemented through the Environmental Management Plan for UWF Grid Connection, which includes a Surface Water Management Plan (See Volume D appended to this EIA Report)

Table 11-19: UWF Grid Connection Project Design Measures relevant to Local Surface Water Bodies

PD ID	Project Design Environmental Protection Measure (PD)
PD17	At Mountphilips Substation, water for operational stage welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site.
PD18	The new substation compound and the new permanent access road at the Mountphilips Substation site will have a permanent surface water drainage network in place which will include check dams. These check dams will allow the settlement of suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD19	At Mountphilips Substation location, where dewatering of trenches or excavations is required, there will be no direct discharge of untreated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate to the volume of water requiring treatment (if any) to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD20	At Mountphilips Substation site, all excavated material will be removed for temporary or permanent storage at designated berms, which will be located more than 25m away from the watercourses on Mountphilips Substation site. All storage berms will be graded and sealed following emplacement. The berms will be covered if there is a risk of erosion. Temporary silt control methods such as silt fencing will be placed around all overburden storage areas. The existing vegetative buffer between the berms and the nearest watercourses will be maintained and no works will occur in the buffer zone.
PD21	At Mountphilips Substation site, the permanent storage berms will be along the new access road and around the substation compound will be planted with local provenance native fruiting hedge species, with grasses and native flower species common to the surrounding vegetation sown along the sides of the berms. Local provenance native wildflower seed of flowering plants like clovers, vetches and knapweed will be included. Revegetation works will take place at the soonest practicable opportunity after emplacement.

PD22	Outside of the Mountphilips Substation site, there will be no storage of overburden and all excavations from road trenches will be removed to licensed waste facilities in accordance with the UWF Grid Connection Waste Management Plan. Loads of excavated material will be covered during transportation to prevent spillages of excavated material.
PD23	All Joint Bays for the 110kV UGC will be located at least 50m from a Class 1 or Class 2 watercourse and at least 25m from Class 3 or Class 4 watercourses.
PD24	Outside of the Mountphilips Substation site, where dewatering of trenches or excavations is required for the 110kV UGC, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD25	Construction works along the 110kV UGC route will cease during heavy or prolonged rainfall events, and any open trenches or excavations will be covered. Use of weathering forecasting will be undertaken in advance of works.
PD26	A phased approach will be undertaken in relation to excavations, excavation dewatering and any culvert replacement works, where these works occur within 50m of a watercourse. The phased approach will only permit one of main potential sediment producing activities (i.e. excavations, excavation dewatering or culvert replacement works), to be carried out within 50m of a watercourse, at any one time.
PD27	At Mountphilips Substation site, works within 50m of watercourses, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD28	Along the 110kV UGC on the public road, where works will take place within 50m of a watercourse, additional mitigation measures will be implemented which include silt fencing and placement of sandbag arrangements along preferential surface water flowpaths on the road pavement. Following works on any particular section, any works debris will be removed from the road before the sandbags and silt fences are removed.
PD29	Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included. This will minimise/avoid the requirement for any excavation dewatering as a result of waterlogged soils or surface water runoff. None of these 110kV UGC sections are within the Lower River Shannon SAC.
PD30	Lines of silt fencing and sandbags will be erected along the edge of the road so that surface water runoff from adjacent construction works areas is captured and directed to the excavated trench, where it can be pumped and treated before being released, as per PD24.
PD31	Works to bridge parapet walls at watercourse crossings W7, W36, W53 will be carried out during dry weather, and debris netting will be fixed to the outside of the walls in order to prevent any debris falling into the watercourse below.
PD32	At Mountphilips Substation site, instream construction works at the watercourse crossings W1, W2 and W3 will be followed by site-specific reinstatement measures to ensure the equilibrated restoration of flow character and morphology within the affected reach to achieve baseline character and avoid any deterioration in morphology as required under the Water Framework Directive (WFD). Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margins to stabilise banks, add flood protection and provide riparian buffer; and the use of deflector plates during the restoration of flow. Instream works at W1, W2 and W3 at the Mountphilips Substation site will be undertaken during dry weather within the IFI instream works window (July – September inclusive). As per PD41, instream works at W1, W2 and W3 will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures

	and Best Practice are followed. Although intended for the purpose of the WFD, this measure will also indirectly contribute to downstream water quality protection in the SAC.
PD33	All new permanent watercourse culverts at the Mountphilips Substation site and any replacement culverts along the public road for the 110kV UGC will be sized to cope with a minimum 100-year flood event.
PD34	Only precast concrete culverts or structures will be used at the watercourse crossing locations at Mountphilips Substation site and for any culvert replacements along the 110kV UGC. Only precast concrete chambers will be used at Joint Bay locations. No batching of wet cement will take place on-site.
PD35	Concrete pours will be required for the 110kV UGC cables trench. Only chutes will be washed out at the works locations into the cable trench, with the washout of the tank taking place at the concrete supplier depot. Concrete chute washouts within the SAC boundary will take place into designated bins for removal to the designated concrete wash settlement pond at the Mountphilips Substation site.
PD36	The sections of 110kV UGC trenches that overlap the Lower River Shannon SAC will be lined with an impermeable geotextile material to prevent potential migration of cement from the trench base or sides into the SAC.
PD37	In addition to PD22, there will be no storage of overburden within the Lower River Shannon SAC.
PD38	110kV UGC works outside of Mountphilips Substation site will be carried out entirely on paved roads and where the 110kV UGC crosses watercourses, the works will be carried out over the existing bridges and over/under existing culverts. No in-streams works are proposed at any watercourse crossing points (including the Newport River and Bilboa River crossings) within the boundary of the Lower River Shannon SAC and therefore there will be no placement of cement or other materials within the river channels or on the river banks within the SAC.
PD39	In addition to PD42, there will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within 100m of the boundary of the Lower River Shannon SAC.
PD40	In addition to PD29, all 110kV UGC works within the boundary of the Lower River Shannon SAC will only be completed during dry weather in the dryer months of the year – i.e. February to September included.
PD41	The instream works at W1, W2 and W3 at Mountphilips Substation site, and the culvert replacement works at the 13 existing culverts on the public road, and all works (including concrete placement) within the boundary of the Lower River Shannon SAC, will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice Measures are followed.
PD42	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD43	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound at the Mountphilips Substation site. All fuel will be stored in bunded, locked storage containers. The designated storage location will be greater than 100m from a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored at the designated location in the temporary compound and all operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD44	Overnight parking of plant and machinery will only be permitted at the temporary compound at the Mountphilips Substation site and at a distance greater than 50m from watercourses.
PD45	The horizontal directional drilling works at W8 and W9 will be carried out by an experienced Drilling Contractor and supervised and managed by a competent and experienced Mud Engineer who understands the technicalities and challenges of drilling works. The Mud Engineer will advise

	the Construction Manager on the selection of competent drillers for the HDD works; monitor the watercourse bed during drilling works, and will supervise the drilling works including the drilling pressures and the implementation of any contingency measures. From a surface water quality protection perspective, the area around the launch/reception pit, bentonite batching, pumping and recycling plant will be bunded using appropriate terram geotextile and/or sandbags in order to contain any spillages. Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized water tight skip before being taken off-site to a suitably licensed waste facility. In the event of a break-out occurring, the Environmental Emergency Response Procedure for Frac-Out will be implemented which includes the following contingency measures; In the event of break-out occurring in the river bed, the rig will immediately shut off the pumps and the drilling assembly will be pulled off to reduce annular pressures; In the event of break-out on the road an excavator will be available to dig a pit to contain fluid with vacuum trucks/pumps available to transfer drill fluid from the containment point back to the recycling point; and in either scenario, drilling fluid additives designed to plug the formation will be introduced to the circulation system and let set. Environmental Emergency Response Procedures are included in the UWF Grid Connection Environmental Management Plan (see Volume D).
PD46	All construction works will be monitored on a daily basis by the Environmental Clerk of Works and by members of the Environmental Clerk of Works team (for example Site Ecologist) as required, for compliance with the Environmental Commitments, which include the Project Design Measures, as per the UWF Grid Connection Environmental Management Plan (see Volume D).
PD47	Surface water quality monitoring of the main watercourses downstream of the works will be carried out to ensure that the downstream water quality status in the receiving water is maintained and that there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009. Where non-compliance in water quality is measured or recorded, works will stop until the issue is resolved. The surface water monitoring locations and sampling programme are defined in the Surface Water Management Plan for UWF Grid Connection. The Surface Water Management Plan is part of the UWF Grid Connection Environmental Management Plan (see Volume D).
PD48	The new permanent cross structures at the Mountphilips Substation site and the replacement culvert at W14 along the R503 will be bottomless or clear spanning.
PD49	In-stream works at Mountphilips Substation site and culvert replacement works at W14 along the R503 Regional Road will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
PD50	Culvert replacement works along the 110kV UGC will not be undertaken without isolation of flow within the watercourse. Isolation of flow will be achieved through the use of sandbags filled with clean, washed sand. Any fish within the isolated section will be removed prior to works commencing. This will require the engagement of licensed fisheries personnel to deplete the works area using electrofishing and, following collection of biometrics, transferred immediately downstream of the crossing point and placed back in the water. The water will then be isolated from the works by over pumping using a flume (pipe), with deflector plates used on the downstream side of the flume to reduce the hydraulic power of the water. Construction works at the crossing will be followed by site-specific reinstatement measures to ensure the equilibrated restoration of flow character and morphology within the affected reach to achieve baseline character and avoid any deterioration in morphology as required under the Water Framework Directive (WFD). Measures will include: bank stabilization measures, reinstatement of bank slope and character; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and the use of deflector plates during the restoration of flow. As per PD41, culvert replacement works will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice are followed. These measures will ensure that the baseline character is maintained and will ensure that a deterioration in morphology is avoided, as required under

	the Water Framework Directive. This in turn will protect Aquatic Ecology.

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works, UWF Replacement Forestry and UWF Other Activities and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3, 5.4, 5.5 and 5.6, in Volume C4: EIAR Appendices.

11.2.4 EVALUATION OF IMPACTS to Local Surface Water Bodies

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

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

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

Table 11-20: 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 earthworks (excavations and storage of overburden), (construction stage)	*Surface Water Quality Impacts due to Nutrient Input(construction stage)*
Water quality impacts from dewatering of excavations (i.e. cable trench and substation works), (construction stage)	*Decommissioning Stage effects*
Morphological Impacts to watercourses due to in-stream works (construction stage)	
Surface water quality impacts due to watercourse crossing works, (construction stage)	
Surface Water Impacts due to Contamination by Fuels, Oils and Chemicals, (construction stage)	
Water Quality Impacts from Cement Based Compounds, (construction stage)	
Surface Water Quality Impacts during Directional Drilling Works (construction stage)	
Surface water quality impacts during forestry felling (construction stage) *(Other Elements only)*	
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 hardstanding surfaces, (operational stage)	
Cumulative Impact *with Other Projects*: Surface Water Quality Effects from Suspended Solids - in the Killleengarrif_SC_010 sub-catchment - in the Newport (Tipperary)_SC_010 sub-catchment	

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 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: Surface water quality impacts due to earthworks

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Earthworks/Storage of Overburden
Cumulative Impact Source: Earthworks/Storage of Overburden, UWF Replacement Forestry planting works
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Indirect surface water quality impacts from entrained sediment in surface water runoff arising during excavations and groundwork associated with the compounds, foundations, access roads, trenching, and joint bays. 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. Permanent storage of overburden will be as berms along the works area.

Impact Quality: Negative

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

Element 1: UWF Grid Connection– direct/indirect impact

Impact Magnitude:
Indirect surface water quality impacts from entrained sediment in surface water runoff arsing during excavations and groundwork across the project footprint and also the storage of overburden associated with the Mountphilips Substation site. Approximately 5000m^3 of overburden will be permanently excavated and stored along the construction works area boundary as linear berms along the permanent access road and around the substation compound at the Mountphilips Substation site. Temporary excavation and storage of a small volume of soils will also occur at the End Mast crane hardstand location for a short period of time. It should be noted that the works at the Mountphilips Substation site will be in the Ballyard_010 catchment which drains into the Newport River c.6km downstream at a point to the south of Newport town.

It is possible that earthworks could result in negligible surface water quality impacts locally. This is due to the small scale of the works, their location away from water courses and the implementation of detailed comprehensive mitigation measures close to and at watercourse crossing locations.

Excavations (totalling 23,380m^3) on the public road section of the 110kV UGC will not involve storage of overburden, with all excavations from the trench being removed to licensed waste facilities.

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 work is spread out over a large geographical area (latitudinal distance of 23km) and within sub catchments (Killeeengarriff_SC_010, Newport (Tipperary)_SC_010, Bilboa_SC_010 and Suir_SC_030);
- The transient nature of the works (i.e. construction work will be carried out in stages over a period of 10 - 12 months over an 18 month period, within a very large geographical areas);
- The majority of the 110KV UGC is along public roads;
- Due to the relatively small footprint area of the works at Mountphilips Substation the potential to generate large volumes of sediment in runoff is low; all excavated material will be removed for temporary or permanent storage at designated berms, which will be located more than 25m away from the watercourses on Mountphilips Substation site (Project Design Measure);

- At Mountphilips Substation site, works within 50m of watercourses, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting. (Project Design Measure);
- The permanent storage berms will be seeded at the soonest practicable opportunity after emplacement (Project Design Measure); and,
- Surface water quality effects will be localised to the works areas, brief to temporary in duration and reversible

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Inch (Bilboa)_010 (Shannon catchment) and the Clodiagh (Tipperary)_010 (Suir catchment), where works for UWF Grid Connection and UWF Related Works and Upperchurch Windfarm will take place.

All arising occurring due to the UWF Grid Connection Works within the Clodiagh (Tipperary)_010, Inch (Bilboa)_010 surface water bodies will be removed from works areas to licensed waste facilities. No storage of overburden material. Storage of overburden material due to the UWF Grid Connection occurs only at Mountphilips substation which do not share the same surface water bodies of the Other Elements.

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

The potential for the consented Newport Town Park, consented Castlewaller Windfarm and potential Bunkimalta Windfarm, to cause cumulative effects with UWF Grid Connection is evaluated in Section 11.2.4.11 below.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- In-combination effects on surface water quality within the River Shannon are likely to be negligible due to the small extent of in-combination works in this catchment – i.e. the majority of UWF Related Works, Upperchurch Windfarm and UWF Replacement Forestry are located in the Suir catchment, which limits the potential for cumulative impacts.
- the localised nature of UWF Related Works effects due to the scale of these works;
- imperceptible effects associated with UWF Replacement Forestry;
- the implementation of the Sediment & Erosion Control Plan for the consented Upperchurch Windfarm;
- Temporary nature of the works

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

Element 2: UWF Related Works

Impact Magnitude:
The potential for water quality effects will arise during excavations required for the Internal Windfarm Cable trench (17.9km), temporary access roads (5.3km), Haul Route Works, Realigned Windfarm Raods and the Telecom Relay Pole works.
Up to 930m^3 of overburden will be permanently stored along the internal cabling route as linear berms and up to 10,850m^3 will be temporarily be stored for later reinstatement along the wind farm works area. It is possible that erosion of these storage areas could result in surface water quality impacts locally.
Due to the transient and spread out nature of the works around the windfarm site and the fact that most of the local watercourses are drains or marginal watercourses, the magnitude of impact is considered to be Small Adverse.

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

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

Impact Magnitude:

The UWF Replacement Forestry area is approximately 6ha in area. The UWF Replacement Forestry drains to a headwater stream of the Clodiagh River. Tree planting will be completed by hand, and there will be no requirement for rill ploughing or any earthworks. The potential for the planting works to generate sediments in runoff is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

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

Element 4: Upperchurch Windfarm

Impact Magnitude:

Based on Chapter 15 (Hydrology Chapter, see Reference Documents Volume F8) and the Sediment and Erosion and Control Plan from the 2013 EIS, release of sediment during the construction phase is likely to have a

temporary negative effect locally during excavation work. The residual effects were considered to be Not Significant.

Impact Evaluation: Not Significant

Rationale for Impact Evaluation:

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

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Consented Newport Town Park, Consented Castlewaller Windfarm, and *Potential* Bunkimalta Windfarm - *Please refer to Section 11.2.4.11 for cumulative information and evaluation*

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

Whole UWF Project Effect

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

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

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

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

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

- Please refer to Section 11.2.4.11 below for cumulative Impacts Evaluation: Surface Water Quality Effects from Suspended Sediments in the Killleengarrif_SC_010 and *Newport (Tipperary)_SC_010 sub-catchments.*

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

Impact Description	
Project Life Cycle Stage:	Construction stage

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

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Significant dewatering is not expected at the Mountphilips Substation site. The majority (29.2km of 30.5km) of the UWG Grid Connection is along the carriageway of public roads or private paved road and therefore significant groundwater or surface water inflows into the cable trench are not anticipated. Existing road drainage is likely to limit any significant inflows into the trench.

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- There will be no direct discharge of pumped water into any watercourse or drain (Project Design Measure). All pumped water will be treated using a mobile water treatment train and then discharged via a silt bag;
- The route of the 110kV is predominately along the carriageway of public roads and therefore significant trench dewatering is not anticipated;
- Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included. (Project Design Measure);
- Lines of silt fencing and sandbags will be erected along the edge of the road so that surface water runoff from adjacent construction works areas is captured and directed to the excavated trench, where it can be pumped and treated before being released (Project Design Measure);
- Works will not be completed during extreme or prolonged rainfall events in order reduce the risk of surface water inflows into the trench (project design); and,
- All effects will be localised, brief to temporary in duration and reversible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Inch (Bilboa)_010, Bilboa_010, and Clodiagh (Tipperary)_010, local surface water bodies.
No significant dewatering requirement is anticipated for the 110kV UGC as the route is entirely within the carriageway of public roads or paved and all of the watercourse crossings are already culverted or will be crossed by installing the cables within the structure of bridges.
No significant excavation dewatering is expected for Internal Windfarm Cabling or the Upperchurch Windfarm

due to the upland location and shallow nature of excavations for these works.
Effects associated with excavation dewatering will be rare, isolated within separate catchments and brief in duration if they occur and therefore the in-combination magnitude of effect is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

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

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

Element 2: UWF Related Works

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The elevated nature of the Internal Windfarm Cabling route and shallow excavation works means significant groundwater inflows are not expected (the 20 no. trial holes undertaken at the windfarm site show 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 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) of the 2013 EIS, limited and discontinuous seepage is expected from the sides of the turbine bases in sloping ground, and this is more likely to occur wetter winter periods.

Significance of the Impact: Not Significant.

Rationale for Impact Evaluation:

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

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Consented Newport Town Park, Consented Castlewaller Windfarm, and *Potential* Bunkimalta Windfarm - *Please refer to Section 11.2.4.11 for cumulative information and evaluation*

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

Whole UWF Project Effect

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

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- Location of the 110kV UGC within public roads, thereby reducing the potential for inflows into excavations;
- Significant in-combination effects from excavation dewatering is not expected to occur within the River Suir catchment as a result of the Consented UWF Turbine works, or the Internal Windfarm Cabling works as no significant groundwater pumping is expected; and,
- All pumped water from the works areas 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 for cumulative Impacts Evaluation: Surface Water Quality Effects from Suspended Sediments in the Killleengarrif_SC_010 and *Newport (Tipperary)_SC_010 sub-catchments.*

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Watercourse crossing, in-stream works

Cumulative Impact Source: Watercourse crossing, in-stream works

Impact Pathway: Direct Excavations

Impact Description: Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this channel shape over time. Direct morphological impacts on watercourses will occur during in-stream works such as open trenching for the cable laying and/or culvert emplacement / replacement. These works will involve the excavation of the banks and the bed, along with the removal of some riparian vegetation. The banks and bed of the watercourse will be reinstated following any trenching or culvert works.

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude: Instream works relate to the 3 no. watercourses at the Mountphilips Substation site (W1, W2 and W3), and the culvert replacement works at up to 13 no. existing culverts along the route of the 110kV UGC.

The 3 watercourse crossings at the Mountphilips Substation site are located in agricultural lands. All 3 will require instream works for 2 new permanent crossings and 1 temporary crossing, these are part of the Ballyard_010 catchment which flows into the Newport River 6km downstream of the Mountphilips Substation site.

63 no. watercourse crossings occur along the public road network, and there are a mix of culverts (48 no.) and bridges (15 no.) in place. The public road section of the route goes through the following local surface water bodies from west to east: Newport (Tipperary)_040, Annagh_030, Annagh_020, Bilboa_010, Inch_(Bilboa)_010 and the Clodiagh_010.

Bridge structure works (road level works and works to parapet walls) will be required at the 3 main bridges along the 110kV UGC at the Rockvale Bridge (W7), Tooreenbrien Bridge (W36) and Anglesey Bridge (W53). However, these works will not involve instream works. No instream works will be required at the remaining 12 no. bridges or 35 no. of the culvert crossings along the route. However, due to the nature of upto 13 no. culverts (being old masonry box culverts), culvert replacement works may potentially[2] be required at these 13 no. culvert crossings.

The last 2 No. watercourse crossings (W67 and W68) are at the eastern extremity of UWF Grid Connection and occur under a private paved road with existing culverts are in place and no instream works are required. Both of these watercourse crossings are located in the Clodiagh_010 catchment.

Due to the relatively minor nature of the watercourses being crossed (75% are Class 4 drains or Class 3 low ecological importance), the fact that most are already culverted and the distributed nature of the works within several local surface water bodies over a large geographical area, the magnitude of impact is considered to be

[2] Based on site investigations, up to 13. No. existing culverts potentially may need to be replaced along the route of the 110kV UGC, this number is used in EIAR to facilitate the cumulative evaluation of the worst case scenario.

negligible (refer to Table 11-5).

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 vast majority of the watercourse crossing points are existing culverts along the public road network;
- The 13 no. watercourse crossings where culvert replacement works are potentially required are distributed within several local surface water bodies (i.e. impacts will not be concentrated within one surface water body) across a large geographical area (latitudinal distance of 23km);
- The 13 no. watercourse crossings where culvert replacement works are potentially required are mostly Class 3 or Class 4 watercourses (12 of the 13)
- 50 of the 68 watercourses have been in some way altered by the fact they are already culverted under roads;
- The effects will typically be brief to temporary in nature and reversible with reinstatement of the watercourse channel; and,
- The works will not negatively affect the overall WFD surface water body status as the magnitude of effects will be negligible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects only relates to the Clodiagh (Tipperary)_010 local surface water bodies (within the River Suir regional catchment), where instream works for both UWF Grid Connection and UWF Related Works occur. In total UWF Grid Connection will potentially require the replacement of 1 No. existing culvert under the L2264-50 to be replaced and UWF Related Works will require 26 No. instream works in the Clodiagh (Tipperary)_010 catchment.

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

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

Due to the relatively minor nature of the watercourses being crossed (75% are Class 4 drains or Class 3 low ecological importance), the fact that most are already culverted the magnitude of impact is considered to be negligible (refer to Table 11-5).

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

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

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

Element 2: UWF Related Works

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

the Clodiagh (Tipperary)_010 waterbody catchment and 3 in the Owenbeg_10 waterbody catchment.

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

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

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

- As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- 75% of the in-stream works areas are at Drains (Class 4) or marginal watercourses (Class 3);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams;
- The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);
- The effects will be brief to temporary in nature and reversible (with the exception of the 9 no. permanent crossings); and,
- The works will not negatively affect the overall WFD surface water body status as the magnitude of effects will not be significant.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

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

Element 4: Upperchurch Windfarm

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

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

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

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

Whole UWF Project Effect

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

Local Surface Water Bodies

Sensitive Aspect

Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water bodies; • 50 of the 68 watercourse crossings along the UWF Grid Connection are already culverted of which 13 no. may potentially require instream works. Of the 13 no, 12 no. are located at Class 3 and Class 4 watercourses; • 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 Upperchurch 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).

Topic

Water

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

Impact Description	
Project Life Cycle Stage:	Construction stage

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

Impact Description: Direct surface water quality impacts as a result of sediment release during watercourse crossing works such as instream works, or works at existing crossing structures, or works in close proximity. Indirect water quality impacts may also arise from nearby working area runoff, pumped water and dewatering works.

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
There are 68 no. watercourse crossings along the 110kV UGC- instream works will be required at 3 watercourses within the Ballyard_010 catchment at the Mountphilips Substation site; and works to replace existing culverts under the public road will be potentially required at up to 13 no. locations (W13, W14, W15, W17, W19, W20, W32, W34, W55, W57, W60, W61 and W64) along the route of the 110kV UGC. In addition works to raise the level of the road and raise the level of parapet walls will occur at 3 no. bridges. Trenching works will also take place at 12 no. other existing bridges and over or under 37 no. existing culverts. There is potential for surface water quality effects at each crossing over the duration of the works (generally 2-3 days per watercourse) and so Project Measures have been incorporated into the design in order to break the pathway between the works area (source) and the Receptor (water course).

Due to the fact that 65 of the 68 no. watercourse crossings along the UWF Grid Connection are existing culverts and bridges, and the distributed and transient nature of the works within several local surface water bodies over a relatively large geographical area, the magnitude of impact is considered to be Negligible.

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;
- Culvert replacement works may potentially be required at 13 locations; of which 12 of the 13 no. are class 3 or class 4 watercourses
- The drains (Class 4) and marginal watercourses (Class 3) have typically low flows or no flows, and therefore the effectiveness of them acting as surface water flowpaths to more sensitive downstream surface watercourses are limited;
- Instream works at W1, W2 and W3 at the Mountphilips Substation site will be undertaken during dry weather within the IFI instream works window (July – September inclusive) (Project Design Measure), when flows are likely to be low;
- The instream works/culvert replacement works will not be undertaken without isolation of flow within the watercourse prior to the works commencing (Project Design Measure).
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);
- Only between 1 and 5 watercourse crossings will be completed in any one day (5 construction crews will be working on the UWF Grid Connection route) over the entire length of the UWF Grid Connection (30.5km);

- The watercourse crossings required for the 110kV UGC are distributed across several local surface water bodies over a large geographical area (latitudinal distance of 23km);
- The works will not negatively affect the overall surface water body status; and,
- All potential effects will be localised, brief in nature and reversible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is no potential for cumulative effects as a result of instream works in the River Shannon Catchment as none of the Other Elements will require watercourse crossing works in the Shannon catchment.
There is no potential for cumulative effects with Upperchurch Windfarm or UWF Replacement Forestry as neither of these projects require instream works.
The construction of UWF Grid Connection will potential require the replacement of 1 No. culvert in the Clodiagh (Tipperary)_010 waterbody in the Suir catchment. There will also be watercourse crossing works required at 22 No. watercourse crossing points in the Clodiagh (Tipperary)_10 required for the UWF Related Works. Water quality effects, which are likely to be localised, will have a magnitude of impact Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- No instream works for Upperchurch Windfarm or UWF Replacement Forestry;
- Small number of culverts (1) which may need replacing (and therefore instream works) for UWF Grid Connection in the Suir regional catchment;
- No potential for UWF Grid Connection to have a cumulative effect with the UWF Related Works in the River Shannon catchment because no instream watercrossing works required for UWF Related works in this catchment;
- The works will not negatively affect the overall surface water body status in the Suir catchment because most of the watercourse crossings are drains.

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

Element 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, 26 no. of the total 32 no. crossings are located within the Clodiagh (Tipperary)_010, 5 no. in the Owenbeg (Tipperary)_010, and 1 no. in the Inch (Bilboa)_010. In-stream works will be required at 25 no. of these locations – 22 no. in the Clodiagh (Tipperary)_010and 3 in the Owenbeg (Tipperary)_010. There will be no instream works in the Inch (Bilboa)_010 catchment for UWF Related Works.

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

Significance of the Impact: Imperceptible to Slight

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- 75% of the in-stream works areas are at drains (Class 4) or marginal watercourses (Class 3);
- The drains (Type 4) and marginal watercourses (Type 3) have typically no flows or very low flows, and therefore the effectiveness of them acting as a surface water flowpath to more important downstream surface water bodies are limited;
- The Class 1 and Class 2 watercourses where in-stream works are required only amount to 5 no. and these are

largely small headwater streams;
- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure) and therefore flows are likely to be very low;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure). This will be completed by over pumping, flume (pipe) or diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);
- Only between 1 and 2 watercourse crossings will be completed in any one day (2 construction crews will be working on the UWF Related Works);
- The works will not negatively affect the overall surface water body status, and the magnitude of impact will not be significant; and,
- All effects will be localised, brief in nature and reversible.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:
- No watercourse crossing works required.

Element 4: Upperchurch Windfarm

Impact Magnitude:
The water quality effects of watercourse crossing works with regard to the Upperchurch Windfarm were not assessed directly in 2013 EIS. However, the EIS concludes that overall 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 clear span bridge is consented. Due to the relatively small number of watercourses being crossed and the fact that watercourse crossing works will only be carried out in drains, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required at this watercourse;
- watercourse crossing works will only be carried out in drains.

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Consented Newport Town Park, Consented Castlewaller Windfarm, and *Potential* Bunkimalta Windfarm - *Please refer to Section 11.2.4.11 for cumulative information and evaluation*

Evaluation of Other Cumulative Impacts – Surface Water Quality Impacts due to Watercourse Crossing Works

Whole UWF Project Effect

Cumulative Impact Magnitude:
UWF Grid Connection will require instream works at 3 No. locations at the Mountphilips Substation site, and culvert replacement works at up to 13 No. watercourses along the 110kV UGC. The UWF Related Works will require instream works at 25. No watercourses. The Other Elements will not require any instream works. The

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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.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The watercourse crossing works required for the UWF Grid Connection 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 Upperchurch Windfarm or UWF Related Works watercourse crossings is negligible as most of the crossings are at drains with no or low flows and therefore the effectiveness of them acting as a surface water flowpath to more important downstream surface water bodies to create in-combination effects is negligible;
- The watercourse crossings relating to the Upperchurch Windfarm and UWF Related Works will be completed over a period of 6 – 8 months; and,
- The works will not negatively affect the overall surface water body status, and the magnitude of impact will not be significant.

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

- Please refer to Section 11.2.4.11 below for cumulative Impacts Evaluation: Surface Water Quality Effects from Suspended Sediments in the Killleengarrif_SC_010 and *Newport (Tipperary)_SC_010 sub-catchments.*

Topic **Water**

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

Impact Description	
Project Life Cycle Stage:	Construction stage

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

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

Impact Quality: Negative

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

Element 1: UWF Grid Connection - direct/indirect impact

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- Only relatively small volumes of fuels / oils will be on-site at any one time and therefore no significant effects are expected;
- All fuels required for construction activities will be stored in a designated location, away from main traffic activity, within the Temporary Compound. All fuel will be stored in bunded, locked storage containers (Project Design Measure);
- Overnight parking of plant and machinery will only be permitted at the temporary compound at Mountphilips substation and at a distance greater than 50m from watercourses, and this reduces the risk posed by leaks (Project Design Measure);
- All chemical wastes will be stored in secure, bunded and covered storage containers, in a designated secure part of the Temporary Compound, and will be removed from site and transported to an approved licensed facilities (Project Design Measure);
- There will be no refuelling of plant or machinery permitted within 100m of a watercourse (Project Design Measure);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may occur along the UWF Grid Connection construction works area; and,
- Any effects that do occur will be very localised to the soils and subsoils at the source / works activity area.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Bilboa_010 and Inch (Bilboa)_010) in the Shannon catchment and the Clodiagh (Tipperary)_010 in the Suir Catchment, due to the use of hydrocarbons and machinery run on hydrocarbons for UWF Grid Connection, UWF Related Works, Upperchurch Windfarm and UWF Other Activities, in these catchments. UWF

Replacement Forestry could also contribute to cumulative impacts in the Clodiagh (Tipperary)_010 catchment.

Any effects from oil and fuel usage are likely to occur rarely and be isolated incidents. Given the distributed nature of the works within several local surface water bodies and the fact that only small volumes of fuel/oil will be present on-site at any one time, the in-combination magnitude of effect is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

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

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

Element 2: UWF Related Works

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- Only relatively small volumes of fuels / oils will be on-site at any one time and therefore no significant effects are expected;
- All fuels required for construction activities will be stored in a designated location, away from main traffic activity, within the Temporary Compound. 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 Compound, and will be removed from site and transported to an approved licensed facilities (Project Design Measure);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may occur along UWF Related Works areas; and,
- Any effects that do occur will be very localised to the soils and subsoils at the source / works activity area.

Element 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:

- Small scale of works
- No refuelling or storage of fuels
- Vehicles limited to 4 x 4 jeeps

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology Chapter, see Reference Documents Volume F8) the potential for water quality effects arises from the use and storage of oil and fuels which could result in spills and leaks. The effects were considered to be Not Significant.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- A Fuel and Oil Management Plan is proposed which will storage requirements and emergency procedures for dealing with any spills and leaks.

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

Evaluation of Other Cumulative Impacts – Surface Water Impacts due to Contamination by Fuels, Oils and Chemicals

Whole UWF Project Effect

Cumulative Impact Magnitude:
The Whole UWF Project has the potential 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 Surface Water Bodes and the fact that only small volumes of fuel/oil will be present on-site at any one time, the in-combination magnitude of effect is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The potential for in-combination effects with the 110kV UGC within the River Shannon surface water catchment are negligible as the vast majority of the Consented UWF Turbine, and the UWF Related Works are within the River Suir catchment;
- A Fuel and Oil Management Plan is proposed for the Upperchurch Windfarm which will include storage requirements and emergency procedures for dealing with any spills and leaks;
- The additional volumes of oils and fuels that will be present on the Upperchurch Windfarm site as a result of the UWF Related Works will be negligible;
- The UWF Replacement Forestry is not likely to contribute to in-combination effects with respect to impacts from oils and fuels; and,
- Effects are likely to be due to small isolated localised spills (worst case) that are very unlikely to contribute to in-combination water quality effects within the local surface water catchments.

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

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Cement Based Compounds
Cumulative Impact Source: Cement Based Compounds
Impact Pathway: Runoff and surface water flowpaths
Impact Description: Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment.
Impact Quality: Negative

Evaluation of the Subject Development Impact – Water Quality Impacts from Cement Based Compounds

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Concrete will be used mainly at the Mountphilips Substation building foundations and in the 110kV UGC cable trench and therefore surface water bodies at the substation location and along the route of the 110kV UGC are potential receptors. However, any spills or leaks are likely to only occur occasionally (if at all) 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 1.25m deep trench, and therefore the risk to local surface water bodies is low;
- Lines of silt fencing and sandbags will be erected along the edge of the road so that surface water runoff from adjacent construction works areas is captured and directed to the excavated trench, where it can be pumped and treated before being released (Project Design Measure);
- All cement placed within the 110kV UGC trench will be backfilled before the next section of the trench commence and therefore is low risk of cement washout from the trench;
- Precast concrete structures will only be used at joint bays and at culvert watercourse crossing locations as required (Project Design Measure);
- Therefore, impacts that do arise (worst case) will largely be limited to small, isolated, low volume spills during emplacement of the cement within the cable trench; and,
- Any effects that do occur will be very localised to the source / works activity area.
- Concrete delivery chutes only will be washed out into the excavated trench, with the main washout of the concrete tank carried out at the supplier depot, concrete chute washouts within the SAC boundary will take place into designated bins for removal to the designated concrete wash settlement pond at the Mountphilips Substation site. (Project Design Measure).

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the following local waterbodies: Inch (Bilboa)_010 and Clodiagh (Tipperary)_010 for 110kV UGC trench works, the UWF Related works at the Telecom Relay Pole and the foundations for the Consented UWF Turbines and Consented UWF Substation. Any individual effects are likely to occur occasionally and be isolated incidents (if they occur at all). Given the relatively small volumes of cement will be present on-site at the UWF Grid Connection trench at any one time, the in-combination magnitude of effect is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The relatively small volumes of cement on-site at any one time with the potential to cause surface water quality impacts will be small;
- The use of concrete for UWF Grid Connection mainly relates to pouring of concrete in the cables trenches;
- 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 Grid Connection are expected.

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

Element 2: UWF Related Works

Impact Magnitude:
The use of cement-based compounds will be limited to the Telecom Relay Pole foundation (c.4m^3) and to the 9 no. of public road crossings, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Small scale of concrete use.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) 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.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- During pouring containment measures will be put in place to keep cement within the foundation area and prevent it entering the local drainage routes; and,

• Washing of trucks will be limited to the chutes, and a dedicated concrete washout area will be available on-site.
Element 5: UWF Other Activities– *N/A, evaluated as excluded, see Section 11.2.2.2.1*
Evaluation of Other Cumulative Impacts – Water Quality Impacts from Cement Based Compounds
Whole UWF Project Effect
Cumulative Impact Magnitude: The Whole UWF Project has the potential has the potential to impact on local 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 (if they occur at all). Given the distributed nature of the works within two regional surface water catchments, over two surface water bodies 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.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies; • The potential for in-combination effects with the 110kV UGC within the River Shannon surface water catchment are negligible as the vast majority of the Consented UWF Turbines, and the UWF Related Works are within the River Suir catchment; • 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 Grid Connection or the UWF Related Works are expected.

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

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Groundworks
Cumulative Impact Source: None
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Surface water quality impacts on the local surface water bodies during ground-works associated with directional drilling under the watercourse bed at W8 and W9. Both these watercourse crossings are located in, and limited to, the Newport (Tipperary)_040 catchment. Directional drilling under the watercourse will 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.

The horizontal directional drilling works at W8 and W9 will be carried out by an experienced Drilling Contractor and supervised and managed by a competent and experienced Mud Engineer who understands the technicalities and challenges of drilling works. The Mud Engineer will advise the Construction Manager on the selection of competent drillers for the HDD works; monitor the watercourse bed during drilling works, and will supervise the drilling works including the drilling pressures and the implementation of any contingency measures. From a surface water quality protection perspective, the area around the launch/reception pit, bentonite batching, pumping and recycling plant will be bunded using appropriate terram geotextile and/or sandbags in order to contain any spillages. Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized water tight skip before being taken off-site to a suitably licensed waste facility. In the event of a break-out occurring, the Environmental Emergency Response Procedure for Frac-Out will be implemented which includes the following contingency measures; In the event of break-out occurring in the river bed, the rig will immediately shut off the pumps and the drilling assembly will be pulled off to reduce annular pressures; In the event of break-out on the road an excavator will be available to dig a pit to contain fluid with vacuum trucks/pumps available to transfer drill fluid from the containment point back to the recycling point; and in either scenario, drilling fluid additives designed to plug the formation will be introduced to the circulation system and let set. Environmental Emergency Response Procedures are included in the Environmental Management Plan for UWF Grid Connection (Project Design Measure);

There will be no requirements for drilling for any other element of the Whole UWF Project.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface Water Quality Impacts during Directional Drilling Works

Element 1: UWF Grid Connection

Impact Magnitude:
Indirect water quality impacts on the Newport (Tipperary)_040 during earthworks associated with the directional drilling. Effects could be continuous over the drilling works (c.1 week at each of the 2 locations).
Given that all runoff and pumped water will be treated and then discharged at a location away from W8 and W9 (Project Design Measure), the impact magnitude is likely to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Negligible magnitude combined with the High Importance of the local surface water bodies;
- the launch pits and reception pits will be entirely located within the public road surface and therefore signifi-

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cant 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;
- Works carried out by experienced Drilling Contractor, under the supervision by a competent Mud Engineer;
- Potential effects will be brief in duration and reversible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is no potential for cumulative impacts with either Other Elements or Other Projects, due to separation distances from the drilling locations associated with UWF Grid Connection (W8 and W9), and no drilling is required for any Other Element of the Whole UWF Project.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- no sources of impacts from other elements, Separation distances from other projects

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

Element 2: UWF Related Works

Impact Magnitude: None

Significance of the Impact: No Impact

Rationale for Impact Evaluation: No drilling works required.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Impact

Rationale for Impact Evaluation: No drilling works required.

Element 4: Upperchurch Windfarm

Impact Magnitude: None

Significance of the Impact: No Impact

Rationale for Impact Evaluation: No drilling works required.

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

Evaluation of Cumulative Impacts – Surface Water Quality Impacts during Directional Drilling Works

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:
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).

Significance of the Cumulative Impact: No Cumulative Impact

Rationale for Cumulative Impact Evaluation:

- 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.

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Topic

11.2.4.8 Impact Evaluation Table: Surface water quality impacts during forestry felling

Evaluation of UWF Grid Connection Excluded: As there is no forestry felling associated with the UWF Grid Connection, there is no potential for UWF Grid Connection 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 Grid Connection 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
Cumulative Impact Description for the Other Elements of the Whole UWF Project
Project Life Cycle Stage: Construction stage *(for Other Elements only)*
Other Element 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. Tree felling for the Whole UWF Project 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 2: UWF Related Works
Impact Magnitude: Small areas of coniferous forestry at various locations along the Internal Windfarm Cabling and the Realigned Windfarm Roads will be permanently felled to facilitate construction in these areas. In total, 0.3 hectares of forestry will be felled, and all this will be within the River Suir catchment. Surface water quality effects have the potential to occur locally. Due to the small scale of the overall felling and the fact that the felling areas are relatively remote from each other, the magnitude of impacts is considered to be Negligible.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies; • Relatively small felling area proposed (0.3ha in total); • The total felling area will be required at two separate locations (0.2ha and 0.1ha) with the works being completed at different times; • All felling will be carried out under a tree felling license; • All tree felling will be undertaken using good working practices as outlined by the Forest Service in their "Forestry Harvesting and Environment Guidelines (Forest Service, 2000a) and "Forestry and Water Quality Guidelines" (Forestry Service, 2000b) Project Design Measure; and, • All effects will be localized, brief to temporary in duration and reversible
Element 3: UWF Replacement Forestry
Impact Magnitude: None
Significance of the Impact: No Potential for Impact
Rationale for Impact Evaluation: The UWF Replacement Forestry is currently agricultural land, and therefore no tree felling is required.

Local Surface Water Bodies

Sensitive Aspect

The UWF Replacement Forestry will be a permanent woodland, therefore no harvesting will be required.

Element 4: Upperchurch Windfarm

Impact Magnitude:
A total of 4.35ha will be felled to facilitate the construction of the Upperchurch Windfarm infrastructure (2013 EIS). The majority of the felling will be undertaken in the Clodiagh_010 catchment (River Suir). The impact of tree felling on water quality was assessed in Chapter 15 (Hydrology, see Reference Documents Volume F8) of the 2013 EIS. The overall effects are assessed to be Not Significant.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

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

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Consented Newport Town Park, Consented Castlewaller Windfarm, and *Potential* Bunkimalta Windfarm - *Please refer to Section 11.2.4.11 for cumulative information and evaluation*

Evaluation of Other Cumulative Impacts – Surface water quality impacts during conifer plantation tree felling

Whole UWF Project Effect

Cumulative Impact Magnitude:
The Whole UWF Project has the potential to impact on surface water bodies in the River Suir catchment only. Felling areas are relatively small and located across several local surface water bodies, and therefore effects will be localised.

Given that there is no forestry felling areas associated with the UWF Grid Connection or UWF Replacement Forestry, and that the tree felling required for the UWF Related Works is relatively small compared to the Upperchurch Windfarm tree felling area, the overall magnitude of impact is considered to be Negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible to Small Adverse magnitude combined with the High Importance of the local surface water bodies;
- The areas required for felling relating to the UWF Related Works are small isolated areas that will be felled separate to the Upperchurch Windfarm felling, and therefore the potential for in-combination effects is negligible;
- The area to be felling for the UWF Related Works accounts for only 7% of the Upperchurch Windfarm felling area.
- No forestry felling required for UWF Grid Connection.

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

- Please refer to Section 11.2.4.11 below for cumulative Impacts Evaluation: Surface Water Quality Effects from Suspended Sediments in the Killleengarrif_SC_010 and *Newport (Tipperary)_SC_010 sub-catchments.*

Topic: **Water**

11.2.4.9 Impact Evaluation Table: Increased flood risk

Impact Description	
Project Life Cycle Stage:	Operational Stage

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

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

Evaluation of the Subject Development Impact – Increased flood risk

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Permanent infrastructure for UWF Grid Connection relates to the Mountphilips Substation compound area, and the associated new access road. Runoff from these surfaces may result in increased flow in local watercourses. There are 2 no. permanent watercourse crossings along the route of the new access road. In addition, there are potentially 13 no. existing culverts under the public road which may need to be replaced. Any new culverts installed will be sized to cope with a minimum 100-year flood event (Project Design Measure) and will be at least 900mm in diameter. 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:

- Negligible magnitude combined with the High Importance of the local surface water bodies;

Hardstanding Runoff:

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

New Permanent Culvert Crossings:

- All permanent culverts and replaced culverts will be sized to cope with a minimum 100-year flood event (Project Design Measure);
- At a minimum, all pipe culverts will be 900mm in diameter regardless of the anticipated flood flow (i.e. minimum 900mm culvert will be used in drains regardless if flows are low)
- The new permanent cross structures at the Mountphilips Substation site (2 and W3) and the replacement culvert at W14 along the R503 will be bottomless or 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.

Local Surface Water Bodies

Sensitive Aspect

Element 1: UWF Grid Connection – cumulative impact
Cumulative Impact Magnitude: The potential for cumulative effects only relates to the Clodiagh (Tipperary)_010 (Suir catchment) where UWF Grid Connection works will potentially require 1 No. culvert to be replaced, and UWF Related Works will require the construction of 22 No. new culverts, and will also be associated with new hardstanding areas. New hardstanding areas will also be development for Upperchurch Windfarm in the Clodiagh (Tipperary)_010 catchment. The replaced culvert for UWF Grid Connection will be sized to cope with a minimum of a 100-year flood event. There are no new hardstanding areas or new watercourse crossing structures associated with any of the Other Elements in the Newport (Tipperary)_SC_010, Killeeengarriff_SC_010 and Bilboa_SC_010 EPA sub-catchments, and therefore the cumulative impact is considered to be Negligible. There is no potential for cumulative impacts due to new areas of hardstanding, as UWF Grid Connection will not require any new areas of hardstanding in the same catchments as any of the Other Elements.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies; • All new watercourse crossing culverts will be adequately designed to accommodate any anticipated peak flood flows. • The UWF Grid Connection does not require any new permanent hardstanding areas within the local surface waterbodies associated with the Other Elements.
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: Permanent infrastructure associated with the UWF Related Works will be limited to 0.6km of Realigned Windfarm Access Road. Runoff from these surfaces may result in increased flow in local watercourses. There are 9 no. permanent watercourse crossings required for the UWF Related Works, which potentially could cause localised flooding if undersized. Due to the fact that all permanent hardstanding will have runoff control measures and that all permanent culverts will be sized for peak flood flows (Project Design Measure), the magnitude of impact is considered to be Negligible.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies; Hardstanding Runoff: • The footprint area of the Realigned Windfarm Roads is negligible compared to the area of the local surface water body. Therefore, runoff effects would be negligible; and, • Drainage from the Realigned Windfarm Roads will be within the capture zone of the Upperchurch Windfarm drainage system which will provide attenuation. New Permanent Culvert Crossings: • All permanent culverts will be sized to cope with a minimum 100-year flood event (Project Design Measure); • At a minimum, all pipe culverts will be 900mm in diameter regardless of the anticipated flood flow (i.e. minimum 900mm culvert will be used in drains regardless if flows are low), (Project Design Measure); • All the culverts on Class 1 and Class 2 type watercourses will be bottomless/clear spanning (Project Design Measure); and, • As agreed during a telephone consultation carried out by the EIA Coordinator with OPW, Limerick office,

Topic: **Water**

(February 2018), a Section 50 application will be submitted to the OPW for new crossings and upgrades following the receipt of planning permission for the UWF Grid Connection. The Section 50 applications will be accompanied by a hydraulic assessment of the new crossing structures to ensure they are adequate from a flood prevention perspective.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

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

Element 4: Upperchurch Windfarm

Impact Magnitude: Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) of the 2013, there is a risk of increased runoff to downstream watercourses from impermeable surfaces. The effects were assessed to be Not Significant.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

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

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

Evaluation of Other Cumulative Impacts – Increased flood risk

Whole UWF Project Effect

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

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The permanent hardstanding areas associated with the 110kV UGC (Shannon) and the UWF Related Works (Suir) and Upperchurch Windfarm (mainly 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 UWF Related Works 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).

Local Surface Water Bodies

Sensitive Aspect

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

Impact Description	
Project Life Cycle Stage:	Operational Stage

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

Impact Description: Surface water quality impacts from entrained suspended sediments in stormwater run-off as a result of the erosion of permanent hardstanding surfaces.
Impact Quality: Negative

Evaluation of the Subject Development Impact – Surface Water Quality Impacts due to Runoff from Permanent Hardstanding Surfaces

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Permanent infrastructure along the 110kV UGC will mainly include the access road to Mountphilips Substation and the Mountphilips Substation compound area. Runoff from these surfaces may generate sediments which could end up in local surface watercourses. 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. The Mountphilips Substation Site is located in the Ballyard_010 catchment which drains into the Newport River, c. 6km downstream south of Newport town.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The Mountphilips Substation and the new permanent access road at the Mountphilips Substation site will have a permanent surface water drainage network in place which will include check dams. These check dams will allow the settlement of suspended solids in water runoff while also slowing down the rate of water run-off from these areas. (Project Design Measure)

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: Permanent infrastructure along the 110kV UGC will mainly include the access road to Mountphilips Substation and the Mountphilips Substation compound area, which is located in the Ballyard_010 local surface water body within the Killeengarriff_SC_010 sub-catchment of the Lower Shannon & Mulkear hydrometric area.

There is no potential for cumulative effects with any of the Other Elements of the Whole UWF Windfarm, as none of the Other Elements are located in the Killeengarriff_SC_010 sub catchment.

Significance of the Cumulative Impact: No Cumulative Impact

Rationale for Cumulative Impact Evaluation:

- No cumulative magnitude
- The UWF Grid Connection does not require any new permanent hardstanding areas within the local surface water bodies associated with the UWF Related Works and Upperchurch Windfarm.

Topic: **Water**

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

Element 2: UWF Related Works

Impact Magnitude:
Permanent infrastructure associated with the UWF Related Works will be limited to 0.6km of Realigned Windfarm Road and the Telecom Relay Pole. Runoff from these surfaces may generate sediments which could end up in local surface watercourses. Due to the fact that the permanent footprint associated with the UWF Related Works is negligible in comparison to the local catchment and that runoff from the works will be contained within the Upperchurch Windfarm Drainage, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The footprint area of the Realigned Windfarm Roads is negligible compared to the area of the local surface water body (<1%) therefore any water quality effects would be negligible; and,
- Drainage from the Realigned Windfarm Roads will be within the capture zone of the Upperchurch Windfarm drainage system, and therefore any surface water quality effects will be negligible.

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) of the 2013 EIS, there is a risk of surface water quality impacts during the operational stage as a result of suspended sediments from road and hardstand drainage.

Significance of the Impact: Not Significant

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

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

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

Whole UWF Project Effect

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

Significance of the Cumulative Impact: Imperceptible

Local Surface Water Bodies

Sensitive Aspect

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the High Importance of the local surface water bodies;
- The permanent hardstanding areas associated with the 110kV UGC (Shannon) and the UWF Related Works (Suir) are in separate regional surface water catchments, and therefore there is no potential for in-combination effects;
- The permanent hardstanding areas associated with Upperchurch Windfarm are mainly in the Suir catchment, and where permanent hardstanding will be located within the Shannon catchment, these new hardstanding areas will not be located within the same local surface waterbody as the Mountphilips Substation site.
- 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;
- All new permanent hardstanding for UWF Grid Connection will have a permanent surface water drainage network in place; 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.

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

Topic: **Water**

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

Sensitive Aspect:	**Local Surface Water Bodies – Killleengarrif_SC_010 sub-catchment**
Cumulative Impact:	**Surface Water Quality Effects from Suspended Sediments**
Cumulative Impact Description	
Project Stage	Construction Stage of UWF Grid Connection

Source: Earthworks, overburden storage, instream works, culvert replacement works, bridge works, works near watercourses, works over watercourse crossing structures, excavation dewatering

Cumulative Source: Tree felling, Earthworks and Watercourse Crossing Works

Cumulative Impact Description:

Indirect surface water quality impacts on the Killleengarrif_SC_010 as a result of earthworks, overburden storage and instream works associated with the Mountphilips Substation site and excavations, culvert replacement works, bridge works and near and over watercourses associated with the UWF Grid Connection 110kV UGC, and forestry felling, earthworks and construction works associated with the potential Bunkimalta Windfarm and Castlewaller Windfarm (which are not expected to be built during the same period as UWF Grid Connection, but are nonetheless included for examination by application of the precautionary principle), and the excavations, groundworks and landscaping associated with a consented public park, Newport town park, which is downstream of the UWF Grid Connection. The potential for cumulative effects is likely to be greater in the main Clare River channel downstream of the works.

The UWF Grid Connection is the only Whole UWF Project element within the Killleengarrif_SC_010 sub-catchment.

Impact Quality: Negative

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

UWF Grid Connection Impact Magnitude:

The Mountphilips Substation site and approximately 13.5km of the 110kV UGC exists within the Killleengarrif_SC_010 sub-catchment.

The potential for effects on surface water quality mainly arise from 110kV UGC excavation works and Mountphilips Substation site works. There are 30 no. existing culvert watercourse crossings along the 110kV UGC within the Killleengarrif_SC_010 sub-catchment, 8 No. of which will potentially require replacement. 3 no. new watercourse crossing requiring instream works, 2 no. permanent, 1 no. temporary will also be required at the Mountphilips Substation site.

Due to the transient nature of the works and the fact that the 110kV UGC is mostly (c.12.7km of the 13.5km) within the carriageway of a public road, with the remaining 0.8km within the new site access road at Mountphilips Substation site, the impact magnitude is expected 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 body;
- Due to the relatively small footprint area of the works at Mountphilips Substation the potential to generate large volumes of sediment in runoff is low; At Mountphilips Substation site, all excavated material will be removed for temporary or permanent storage at designated berms, which will be located more than 25m away from the watercourses on Mountphilips Substation site. (Project Design Measure);
- Most of the 110kV UGC route (c.12.7km of the 13.5km) within the Killleengarrif_SC_010 sub-catchment is along a public road;
- Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included. This

will minimise/avoid the requirement for any excavation dewatering as a result of waterlogged soils or surface water runoff. (Project Design Measure);
- There is no in-stream works at the Clare River crossing itself as the 110kV UGC will be installed in the road surface over the bridge, works to raise the road level or height of parapet walls will be carried out from the bridge/road surface;
- It's likely only between 160 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings being completed in any one day (assumed 1 -2 work crews in the catchment);
- The transient nature of the works within the catchment; and,
- All effects will be brief to temporary in nature and reversible.

Other Project: Castlewaller Windfarm *(consented windfarm & potential grid connection)*

Impact Magnitude: While the Castlewaller Windfarm itself is not located within the Killeengarriff_SC_010 sub catchment, the potential route of the associated grid connection is likely to involve works along the public road network through the Kileengarriff_SC_010 subcatchment.

Significance of the Impact: Not significant

Rationale for Impact Evaluation:
- the potential route of the proposed grid connection would most likely be along the carriageway of public roads with minimal works required at watercourse crossing points.

Other Project: Bunkimalta Windfarm *(potential windfarm & consented grid connection)*

Impact Magnitude: It is assumed for the purpose of this cumulative evaluation that at least some of the potential Bunkimalta Windfarm turbines will be located within the Kileengariff_SC_010 sub-catchment upstream of the 110KV route.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
- The design of the windfarm is likely to follow best practice with construction activities located at least a minimum of 50m from watercourses where possible; and,
- It is assumed that a Sediment and Erosion Control Plan will be put in place during the construction phase to control runoff from the site.

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

Cumulative Impact Magnitude: Due to the transient nature of the UWF Grid Connection works, the relatively small number of the Bunkimalta turbines potentially located within the catchment, the potential location of a route for Castlewaller Windfarm grid connection most likely within the public road network, and the relatively large catchment area of the Killleengarrif_SC_010 (122km^2), the magnitude of effects is likely to be Small Adverse.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:
- As per Table 11-7, Small Adverse magnitude combined with the High Importance of the local surface water body;
- The relatively large surface water catchment area of the Kileengarrif_SC_010 sub-catchment – 122km^2; and,
- The transient nature of the 110kV works within the Kileengarrif_SC_010 sub-catchment.

Sensitive Aspect:	**Local Surface Water Bodies - Newport (Tipperary)_SC_010 sub-catchment**
Cumulative Impact:	**Surface Water Quality Effects from Suspended Sediments**
Cumulative Impact Description	
Project Stage	Construction Stage of UWF Grid Connection

Source: excavations, bridge works, works near watercourses, works over watercourse crossing structures, directional drilling works, excavation dewatering
Cumulative Source: Tree felling, Earthworks, Groundworks and Watercourse Crossing Works

Cumulative Impact Description:
Indirect surface water quality impacts on the Newport (Tipperary)_SC_010 as a result of watercourse crossings, and excavations associated with the UWF Grid Connection element of the Whole UWF Project, and the excavations, groundworks and watercourse crossing works associated with the upstream potential Bunkimalta Windfarm and consented Castlewaller Windfarm (which are not expected to be built during the same period as UWF Grid Connection, but are nonetheless included for examination by application of the precautionary principle), and the excavations, groundworks and landscaping associated with a consented public park, Newport town park, which is downstream of the UWF Grid Connection.

The UWF Grid Connection is the only Whole UWF Project element within the Newport (Tipperary)_SC_010 sub-catchment.
Impact Quality: Negative

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

Element 1: UWF Grid Connection

UWF Grid Connection Impact Magnitude:
Approximately 3.15km of the 110kV UGC exists within the Newport (Tipperary)_SC_010 sub-catchment. It should be noted that the Mountphilips Substation site in located in the Ballyard_010 waterbody in the Kileengarriff_SC_010 sub-catchment, the Ballyard_010 drains into the Newport River below Newport town.

The potential for effects on surface water mainly arise from 110kV UGC excavations and works adjacent to watercourse crossings. There are 5 no. watercourse crossings within the Newport (Tipperary)_SC_010 sub-catchment, none of which require instream works or culvert replacement works. Works within the catchment include crossing the watercourses within existing bridge structures (with minor works required to road level and bridge parapets at W7), and directional drilling at 2 other locations which will avoid works to the watercourses or structures at these two locations.

Due to the transient nature of the works and the fact that all 110kV UGC works (in the Newport (Tipperary)_SC_010) will be within the public road surface, the impact magnitude is expected to be Negligible Adverse.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible Adverse magnitude combined with the High Importance of the local surface water body;
- No instream works or culvert replacement works are required for UWF Grid Connection for any of the watercourses within the Newport (Tipperary)_SC_010 sub catchment;
- There is no in-stream works at the Newport River crossing at Rockvale Bridge (W7), the 110kV UGC will be installed within the bridge structure, some minor works may be required to the parapet walls;
- It's likely only between 80 – 100m of the trench will be excavated in any day with only 1 watercourse crossings being completed in any one day (assumed 1 work crew on local roads within this catchment); and,
- All effects will be brief to temporary in nature and reversible.

Local Surface Water Bodies

Sensitive Aspect

Other Project: Bunkimalta Windfarm *(potential windfarm & consented grid connection)*
Impact Magnitude: It is assumed for the purpose of this cumulative evaluation that at least some of the potential Bunkimalta Windfarm turbines will be located within the Newport (Tipperary)_SC_010, up-stream of the UWF Grid Connection (110KV UGC route).
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The design of the windfarm is likely to follow best practice with construction activities located at least a minimum of 50m from watercourses where possible; and, • It is assumed that a Sediment and Erosion Control Plan will be put in place during the construction phase to control runoff from the site..
Other Project: Castlewaller Windfarm *(consented windfarm & potential grid connection)*
Impact Magnitude: The footprint of the Castlewaller Windfarm is entirely located within the Newport (Tipperary)_SC_010, up-stream of the UWF Grid Connection (110KV UGC route). At least part of its potential grid connection (not currently consented or proposed) is assumed to be located within the sub catchment (and likely to be located on forestry roads and public roads within the sub catchment)
Significance of the Impact: Not Significant for the windfarm, as reported in the Castlewaller Windfarm EIS (2011)
Rationale for Impact Evaluation: • A Sediment Control Plan will be put in place during the windfarm construction phase to control runoff from the site. • As per the EIS 2011, construction activities will be at least a minimum of 50m from watercourses where possible; • All tree felling will be completed by keyhole felling to reduce potential surface water quality effects; • The potential grid connection is along the carriageway of public roads with no instream works requirement.
Other Project: Newport Town Park
Impact Magnitude: The footprint of the consented Newport Town Park is entirely located within the Newport (Tipperary)_SC_010, downstream of the UWF Grid Connection (110KV UGC route), and located immediately adjacent to the Newport River. The footprint of the park overlaps the SAC boundary.
Significance of the Impact: Not Significant, as reported in the NIS (2018) for the project
Rationale for Impact Evaluation: • No groundworks within 50m of the river; • A Sediment Control Plan will be put in place during the construction phase to control runoff from the site.
Evaluation of Cumulative Impacts – Surface Water Quality Effects from Suspended Sediments
Cumulative Impact Magnitude: Due to the transient nature of the UWF Grid Connection works, the downstream location of Newport Town Park in the context of the location of the park within Newport town, the large upstream distance to the potential Bunkimalta Windfarm site (~10km), the upstream distance to Castlewaller Windfarm site (4km) and the relatively large combined catchment area of the Newport (Tipperary)_SC_010 (95km^2), the magnitude of effects is likely to be **Small Adverse**.
Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • Small Adverse magnitude combined with the High Importance of the local surface water body; • The relatively small scale of the 110kV UGC works within the Newport (Tipperary)_SC_010 (3.5km); • The large combined surface water catchment area of the Newport (Tipperary)_SC_010 – 95km^2; • The transient nature of the 110kV UGC works within the Newport (Tipperary)_SC_010; • Sediment Control Plans will be/assumed to be in place at the Castlewaller Windfarm/ potential Bunkimalta

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- The Castlewaller Windfarm grid connection is likely to be routed are along public roads and therefore impacts on surface water quality are not expected;
- The Bunkimalta Windfarm grid connection is along public roads and therefore impacts on surface water quality are not expected; and,
- The relatively small scale and localized nature of the Newport Town Park.

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 11-21: 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 Afforest-ation	2, 3	SW Runoff	Surface Water Quality Impacts due to Nutrient Input	Rationale for Excluding: Neutral effect. No forestry felling is required for UWF Grid Connection. The surface water quality effects on local surface water bodies from sedimentation as a result of tree felling for UWF Related Works were assessed to be imperceptible (refer to Section 11.2.4.8).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 negligible magnitude of sedimentation effects, the nutrient loading is assessed to be Neutral. The Upperchurch Windfarm will have a Sediment Control Plan, and therefore, the potential for nutrient loading to local watercourses is assessed to be Neutral as a result of the consented drainage design measures.
Decommissioning Stage Effects				
Rationale for Excluding: no potential for impacts/Neutral impacts The UWF Grid Connection will remain part of the National Grid and is not expected to be decommissioned. Therefore no hydrological impacts are expected. UWF Related Works: The cables will be pulled from the Internal Windfarm Cabling ducts at the turbines or at the substation; the ducting, Realigned Windfarm Roads and Haul Route Works will remain in-situ; therefore, no decommissioning works to lands are required. The Telecoms Relay Pole will be removed, and the compound area reinstated and returned to agricultural. Neutral effects to surface or groundwater are anticipated. The UWF Replacement Forestry will not be harvested or felled but will remain permanently in place. Therefore no hydrological impacts are expected. Upperchurch Windfarm: It is expected that the Consented UWF Substation will remain in-situ for use by ESBN, the UWF Access Roads will also remain in-situ for use by the landowner. Decommissioning works will be limited to the Consented UWF Turbines, Turbine Hardstanding areas, Meteorological Mast and associated drainage systems. All decommissioning works will take place from hard-core areas, with the majority of activity taking place on the turbine hardstands. Therefore, it is considered that decommissioning activities will have Neutral effects on surface water or groundwater.				

11.2.5 Mitigation Measures for Impacts to Local Surface Water Bodies

Mitigation measures were incorporated into the UWF Grid Connection project design, including the Project Design Measures. No additional mitigation measures are required as the topic authors conclude that **significant impacts are not likely to occur to Local Surface Water Bodies**.

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. **Imperceptible**.

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

The UWF Grid Connection Environmental Management Plan also includes Best Practice Measures (BPM), which although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

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

GC-BPM-01	Measures for Protection of Surface Water Quality and Watercourse Morphology during instream works at Mountphilips Substation site
GC-BPM-02	Measures for Protection of Surface Water Quality and Watercourse Morphology during replacement of existing culverts along the 110kV UGC outside Mountphilips Substation site
GC-BPM-03	Design of New Permanent Watercourse Crossing Structures and Existing Culvert Replacements to Prevent Flood Risk
GC-BPM-04	Surface Water Quality Protection Measures for Site Runoff During the Mountphilips Substation Site Construction Works
GC-BPM-05	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-06	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-07	Surface Water Quality Protection Measures During Storage of Overburden at the Mountphilips Substation Site

These Best Practice Measure form part of the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

11.2.7.1 Surface Water Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Surface Water Management Plan. Water quality and the existing drainage regime will be managed under the Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection. This Surface Water Management Plan (SWMP) provides the water management framework for the appointed Contractors and Sub-contractors and it incorporates the mitigating principles described in this EIAR (particularly in this Chapter 11 – Water) to ensure that construction works are carried out with minimal impact on the surface water environment and in accordance with the mitigation measures and project design commitments made in the EIAR.

The Surface Water Management Plan is part of the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

11.2.8 Summary of Impacts to Local Surface Water Bodies

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

The greyed out boxes in the 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 11-22: Summary of the Impacts to Local Surface Water Bodies

Impact to Local Surface Water Bodies:	Morphological Impacts due to instream works	Surface water quality impacts						Water quality impacts from		Increased Flood Risk
		due to earthworks	from dewatering of excavations	from watercourse crossing works	due to forestry felling	during directional drilling works	Runoff from Permanent surfaces	fuels, oils and chemicals	from cement-based compounds	
Evaluation Impact Table	*Section 11.2.4.3*	*Section 11.2.4.1*	*Section 11.2.4.2*	*Section 11.2.4.4*	*Section 11.2.4.8*	*Section 11.2.4.7*	*Section 11.2.4.10*	*Section 11.2.4.5*	*Section 11.2.4.6*	*Section 11.2.4.9*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction	Construction	Operational	Construction	Construction	Operational
UWF Grid Connection (direct effects)	Imperceptible	Imperceptible	Imperceptible	Imperceptible	No Potential for Impact	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible
UWF Grid Connection (Cumulative effects)	Imperceptible	Imperceptible	Imperceptible	Imperceptible	No Potential for Impact	Imperceptible	No Cumulative Impact	Imperceptible	Imperceptible	Imperceptible
Element 2: UWF Related Works	Slight to Moderate	Slight to Moderate	Imperceptible	Imperceptible to Slight	Imperceptible	No impact	Imperceptible	Imperceptible	Imperceptible	Imperceptible
Element 3: UWF Replace. Forestry	No potential for impacts	Imperceptible	No potential for impacts	No potential for impacts	No potential for impacts	No impact	No potential for impacts	Imperceptible	No potential for impacts	No potential for impacts
Element 4: Upperchurch WF	Imperceptible	Not Significant	Not Significant	Imperceptible	Not Significant	No impact	Not Significant	Not Significant	Not Significant	Not Significant
Element 5: UWF Other Activities	No Potential for Impacts - Evaluated as Excluded, see Section 11.2.2.2.1									
Cumulative Impact										
Whole UWF Project Effect	Slight	Slight	Imperceptible	Imperceptible	Imperceptible	No Cumulative Impact	Imperceptible	Imperceptible	Imperceptible	Imperceptible
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities	n/a	Slight – *See Section 11.2.4.11*					N/A - evaluated as excluded, See Section 11.2.2.2			

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Topic

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Sensitive Aspect	Local Surface Water Bodies

11.3 Sensitive Aspect No.2: Local Groundwater Bodies

This Section provides a description and evaluation of the Sensitive Aspect - Local Groundwater Bodies (inclusive of the groundwater that flows below the development).

11.3.1 BASELINE CHARACTERISTICS of Local Groundwater Bodies

11.3.1.1 STUDY AREA for Local Groundwater Bodies

The study area for Local Groundwater Bodies in relation to the UWF Grid Connection is described in Table 11-24 and illustrated on Figure GC 11.3: UWF Grid Connection Study Area for Local Ground Water Bodies (Volume C3 EIAR Figures).

Table 11-23: UWF Grid Connection Study Area for Local Groundwater Bodies

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

11.3.1.2 Baseline Context & Character of Local Groundwater Bodies in the UWF Grid Connection Study Area

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 29km of the total 30.5km) within the Slieve Phelim Groundwater Body (GWB) with the far eastern section of the 110kV UGC route extending into the Te0.mplemore A GWB.

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

The Templemore A GWB extends from north of Templemore south towards Annacarthy and has a total area of 300km^2. The GWB contains the Silvermine Mountains, Kilduff Mountain and Devils bit 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: UWF Grid Connection Study Area for Local Ground Water Bodies.

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.

Groundwater Quality: Both the Slieve Phelim GWB and the Templemore A GWB are assigned 'Good Status'[3] (www.catchments.ie). This applies to both quantitative status and chemical status. The objective for both GWBs is to protect the current 'Good Status' condition.

11.3.1.3 Importance of Local Groundwater Bodies

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

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. Therefore the Importance of Local Groundwater Bodies in the study area is considered to be **Low to Medium** Importance.

11.3.1.4 Sensitivity of Local Groundwater Bodies

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

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

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

11.3.1.6 Receiving Environment (the Baseline + Trends)

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

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

11.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.3.2.1 Cumulative Evaluation Study Areas

11.3.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

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

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

The study is illustrated on Figure CE 11.3 UWF Grid Connection Cumulative Evaluation Study Area for Local Groundwater Bodies (Volume C3 EIAR Figures).

11.3.2.1.2 Whole Project Cumulative Evaluation Study Area

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

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

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices. Scoping of these Other Elements is presented in Section 11.3.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 11-25 and illustrated on Figure WP 11.3: Whole Project Study Area for Local Groundwater Bodies.

Table 11-24: Whole Project Cumulative Evaluation Study Area for Local Groundwater Bodies

Cumulative Evaluation of all of the Elements of the Whole UWF Project		
Cumulative Project	**Cumulative Study Area Boundary**	**Justification for Study Area Extent**
Element 1: UWF Grid Connection	Local GWBs catchment divides as defined by GSI/WFD within 300m of construction works areas	Within the underlying aquifer, groundwater flowpaths are expected to be relatively short, typically from 30-300m before groundwater discharges locally into streams. Therefore, for cumulative effects to occur on groundwater, other elements will have to be within Other Elements will have to be within 300m of another Element.
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

11.3.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Local Groundwater Bodies also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Local Groundwater Bodies with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.19).

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

11.3.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Local Groundwater Bodies

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Local Groundwater Bodies. The results of this evaluation are included in Table 11-26.

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

Table 11-25: Results of the Evaluation of the Other Elements

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

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

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11.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.3.2.3.1 Element 2: UWF Related Works & Element 4: Upperchurch Windfarm

The consented Upperchurch Windfarm and 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 Upperchurch Windfarm and 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. 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.

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

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

11.3.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element 3 evaluated as excluded. See Section 11.3.2.2.1.

11.3.2.3.3 Element 5: UWF Other Activities

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

11.3.2.3.4 Other Projects or Activities:

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.3.2.2.

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11.3.3 PROJECT DESIGN MEASURES for Local Groundwater Bodies

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

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

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

The Project Design Measures outlined in Table 11-27 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect Local Groundwater Bodies.

Table 11-26: UWF Grid Connection Project Design Measures relevant to Local Groundwater Bodies

PD ID	Project Design Environmental Protection Measure (PD)
PD16	No refuelling of plant or equipment will be permitted within 100m of identified water supply wells
PD17	At Mountphilips Substation, water for operational stage welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site.
PD24	Outside of the Mountphilips Substation site, where dewatering of trenches or excavations is required for the 110kV UGC, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD34	Only precast concrete culverts or structures will be used at the watercourse crossing locations at Mountphilips Substation site and for any culvert replacements along the 110kV UGC. Only precast concrete chambers will be used at Joint Bay locations. No batching of wet cement will take place on-site.
PD35	Concrete pours will be required for the 110kV UGC cables trench. Only chutes will be washed out at the works locations into the cable trench, with the washout of the tank taking place at the concrete supplier depot. Concrete chute washouts within the SAC boundary will take place into designated bins for removal to the designated concrete wash settlement pond at the Mountphilips Substation site.
PD42	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD43	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound at the Mountphilips Substation site. All fuel will be stored in bunded, locked storage containers. The designated storage location will be greater than 100m from a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored at the designated

	location in the temporary compound and all operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD44	Overnight parking of plant and machinery will only be permitted at the temporary compound at the Mountphilips Substation site and at a distance greater than 50m from watercourses.
PD46	All construction works will be monitored on a daily basis by the Environmental Clerk of Works and by members of the Environmental Clerk of Works team (for example Site Ecologist) as required, for compliance with the Environmental Commitments, which include the Project Design Measures, as per the UWF Grid Connection Environmental Management Plan (see Volume D).

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

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11.3.4 EVALUATION OF IMPACTS to Local Groundwater Bodies

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) - 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 Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals (construction stage)	*Operational Stage Effects*
Groundwater quality impacts from cement-based compounds (construction stage)	*Decommissioning Stage Effects*
Groundwater level (quantity) impacts from dewatering of excavations (construction stage)	

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 11.3.4.1 to 11.3.4.3.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 11.3.4.4.

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

Impact Description	
Project Life Cycle Stage:	Construction stage

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

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

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

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 two groundwater bodies, the localised groundwater flow regime (short flowpaths to local streams and rivers) 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 11-6, Negligible magnitude combined with the Low to Medium Importance of the local aquifer (Poor – Locally Important Aquifer);
- All fuels required for construction activities will be stored in a designated location, away from main traffic activity, within the Temporary Compound at Mountphilips Substation. All fuel will be stored in bunded, locked storage containers (Project Design Measure);
- Overnight parking of plant and machinery will only be permitted at the temporary compound at the Mountphilips Substation site and at a distance greater than 50m from watercourses, 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 Compound, and will be removed from site and transported to approved licensed facilities (Project Design Measure);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may occur along the UWF Grid Connection construction works area;
- Any accidental minor (low volume) spills on the ground surface will likely be absorbed by the underlying soils/subsoils and not be leached into the underlying groundwater;
- The majority of the 110kV route is along public roads which will reduced the potential for impacts on groundwater quality in the unlikely event of spills and leaks.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effects of the UWF Grid Connection with the

Local Groundwater Bodies

Sensitive Aspect

UWF Related works to local groundwater to occur along the public road in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons and along the private paved road in Knockcurraghbola Commons where both UWF Related Works and/or Upperchurch Windfarm works occur within 300m of UWF Grid Connection. All fuels required for Upperchurch Windfarm/UWF Related Works construction activities will be stored in a designated location, away from main traffic activity, within the windfarm Site Compound No.1 which is greater than 300m from UWF Grid Connection 110kV UGC works.
Given the transient and distributed nature of the works within the groundwater body, the localised groundwater flow regime (short flowpaths to local streams) and the fact that only small volumes will be present on-site at one time, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-6, Negligible magnitude combined with the Low Importance of the local aquifer (Poor Aquifer);
- 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.
- The location of the 110kV within public roads and paved private road will reduced the potential for impacts on groundwater quality in the unlikely event of spills and leaks.

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

Element 2: UWF Related Works

Impact Magnitude:
Plant and equipment will be used at all the UWF Related Works areas and therefore groundwater under the construction works areas is a potential receptor. However, any effects are only likely to be minor and localised. Given the transient and distributed nature of the works within the groundwater body, the localised groundwater flow regime (short flowpaths to local streams) and the fact that only small volumes will be present on-site at one time, the magnitude of impact is considered to be Negligible. The Project Design Measures, which are listed below, are also considered in the assessment of magnitude.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-6, 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 Site Compound No.1 (Upperchurch Windfarm), and will be removed from site and transported to an approved licensed facilities (Project Design Measure);
- Therefore, any incidents that do occur will largely be limited to small, isolated, low volume spills / leaks that may occur along the works area; and,
- Any accidental minor (low volume) spills on the ground surface will likely be absorbed by the underlying soils/subsoils and not be leached into the underlying groundwater.

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) 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.

Water

Topic

Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • Implementation of a Fuel Management Plan which will require best practices to be carried out in respect of refuelling, handing and storage of fuels; and, • Procedures and contingency plans will be setup to deal with accidental spills and leaks.
Element 5: UWF Other Activities– *N/A, evaluated as excluded, see Section 11.3.2.2.1*
Evaluation of Other Cumulative Impacts – Groundwater quality impacts due to Contamination by Fuels, Oils and Chemicals
Whole UWF Project Effect
Cumulative Impact Magnitude: Plant and equipment will be used at all the Whole UWF Project works areas, and therefore groundwater along the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm works areas are potential receptors. However, any effects are only likely to be minor and localised. Given the transient and distributed nature of the works within two separate groundwater bodies, the localised groundwater flow regime (short flowpaths to local streams) and the fact that only small volumes will be present on-site at one time, the in-combination magnitude of impact is considered to be **Negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-6, **Negligible** magnitude combined with the **Low to Medium Importance** of the local aquifers; • The construction work areas associated with the UWF Grid Connection (91% within Slieve Phelim GWB) and the UWF Related Works and Upperchurch Windfarm (84% within Templemore A) are largely located in separate groundwater bodies, and therefore there is no potential for significant in-combination effects; and, • Groundwater flowpaths in the area of the Upperchurch Windfarm and UWF Related Works are expected to be localised (i.e. any recharge on the local hills will discharge into local streams) and therefore increased concentrations of hydrocarbons in groundwater locally as a result of isolated spills/leaks within the windfarm is not expected.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Local Groundwater Bodies with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.3.2.2).

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Cement based compounds
Cumulative Impact Source: Cement based compounds
Impact Pathway: Soil / subsoil pore space and groundwater flowpaths

Impact Description: Concrete and other cement-based products are highly alkaline and corrosive and can have negative impacts on local groundwater quality.

Impact Quality: Negative

Evaluation of the Impact of the Subject Development – Groundwater quality impacts from cement-based compounds

Element 1: UWF Grid Connection – direct/indirect impact

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 11-6, Negligible magnitude combined with the Low to Medium Importance of the local aquifers (Poor – Locally Important Aquifer);
- Due to the narrow, linear nature of the 110kV UGC trench and the small volumes of cement required per meter (~0.4m^3), the total volume of semi-dry lean-mix cement placed within local groundwater catchments along the route will be small, and the potential for groundwater quality effects will be negligible;
- A relatively small volume of wet cement will also be required at the Mountphilips Substation foundations (both within the Substation Compound and at the foundations for the 2 No. End Masts);
- It is not expected that cement will only come in direct contact with groundwater; and,
- Only a brief to temporary (and reversible) increase in the pH and alkalinity of the local groundwater is likely to occur. The effects will only persist until the cement mix has hardened and the high alkalinity leachate flushed out / diluted by rainfall or groundwater flow. The effects will be assimilated by the local groundwater flow.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effects to groundwater between the UWF Grid Connection and UWF Related Works, where the UWF Related Works Internal Windfarm Cable road crossing R6 comes within 300 meters of the UWF Grid Connection 110kV UGC works on the public road. 210m^3 and 20m^3 of concrete will be associated with the UWF Grid Connection and UWF Related Works, respectively, within the cumulative evaluation study area.
There is potential for cumulative effects to groundwater between the UWF Grid Connection and Consented Upperchurch Windfarm, where the Consented UWF Substation and the Consented UWF Turbine T22 come within 300 meters of the 110kV UGC. Given the volumes to be used on-site are negligible, the cumulative

magnitude of impact is considered to be negligible

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The volumes to be used on-site are negligible;
- It is not expected that cement will only come in direct contact with groundwater; and,
- Any groundwater effects will be temporary and localised

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

Element 2: UWF Related Works

Impact Magnitude: The use of cement-based compounds will be limited to the Telecom Relay Pole foundation (c.4m^3) and 9 No. of public road crossings (c.3-5m each). Therefore no impacts on surface water or groundwater quality are anticipated.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- The volumes to be used on-site are negligible, therefore no impacts on groundwater quality are expected.

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

Element 4: Upperchurch Windfarm

Impact Magnitude:

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-6, 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 Other Cumulative Impacts – Groundwater quality impacts from cement-based compounds

Whole UWF Project Effect

Cumulative Impact Magnitude:

Localised and temporary change in groundwater quality at the footprint of the development areas.

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

Local Groundwater Bodies

Sensitive Aspect

Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-6, **Negligible** magnitude combined with the **Low to Medium Importance** of the local aquifers; • The works areas associated with the 110kV UGC (Slieve Phelim GWB), the UWF Related Works 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 Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.3.2.2).

Topic

Water

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Dewatering
Cumulative Impact Source: Excavation Dewatering
Impact Pathway: Groundwater flowpaths

Impact Description: Impacts on local groundwater levels as a result of pumping of excavations such as the cable trench.

Impact Quality: Negative

Evaluation of the Impact of the Subject Development – Groundwater level (quantity) impacts from dewatering of excavations

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

Significant dewatering is not expected at the Mountphilips Substation site. The majority (29.2km of 30.5km) of the UWG Grid Connection is along the carriageway of public roads or private paved road and therefore significant groundwater or surface water inflows into the cable trench are not anticipated. Existing road drainage is likely to limit any significant inflows into the trench. Due to the fact that the majority of the 110kV UGC is along the carriageway of public roads no dewatering of groundwater is likely. No effects on groundwater levels are likely.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- As per Table 11-6, Negligible magnitude combined with the Low to Medium Importance of the local aquifer (Poor to Locally Important) due to the shallow nature of the cable trench / joint bays, no effects on local groundwater levels and flows are likely; and,
- Location of the 110kV UGC on the public road network.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:

Due to the upland nature of the eastern extent of the 110kV UGC location, no excavation dewatering is expected to occur. Similarly, due to the upland location and absence of groundwater inflows in trial pits investigations for Upperchurch Windfarm, excavation dewatering is not expected for UWF Related Works, with only minimal discontinuous dewatering potentially required for Upperchurch Windfarm in the UWF Grid Connection Cumulative Evaluation Study Area. Therefore, cumulative dewatering effects in this area are unlikely to occur.

Significance of the Impact: No Cumulative Impact

Rationale for Impact Evaluation:

- Due to the shallow nature of the works and the elevated nature of the works area, UWF Grid Connection is not likely to cause effects to groundwater level, either alone or cumulatively with Upperchurch Windfarm and/or UWF Related Works.

Topic: Water
Sensitive Aspect: Local Groundwater Bodies

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
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
Rationale for Impact Evaluation: • Due to the shallow nature of the works and the elevated nature of the works area, no impacts on groundwater levels are expected.
Element 3: UWF Replacement Forestry– *N/A, evaluated as excluded, see Section 11.3.2.2.1*
Element 4: Upperchurch Windfarm
Impact Magnitude: Impacts relating to groundwater levels and flows were not undertake in the 2013 EIS and therefore are evaluated below for the purpose of the cumulative impact assessment. Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) of the 2013, limited and discontinuous seepage is expected from the sides of the turbine bases in sloping ground, and this is more likely to occur during wetter winter periods. This suggests that seepages will largely be as result of surface water runoff or minor groundwater seepages along the subsoil/bedrock interface. However, no seepages were reported during the trial pit investigation which was completed in October 2011. Therefore, the magnitude of impact is considered to be Negligible.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • As per Table 11-6, Negligible magnitude combined with the Low Importance of the aquifer(Poor aquifer); • Due to the elevated nature of the Upperchurch Windfarm site, significant interaction with the local groundwater table is not expected; and, • Groundwater flows (if present) will be limited to groundwater seepage at the subsoil / bedrock interface and therefore significant impacts on local groundwater levels are not expected.
Element 5: UWF Other Activities– *N/A, evaluated as excluded, see Section 11.3.2.2.1*
Evaluation of Other Cumulative Impacts – Groundwater level (quantity) impacts from dewatering of excavations
Whole UWF Project Effect
Cumulative Impact Magnitude: No dewatering of groundwater is likely to be required for UWF Grid Connection or UWF Related Works, Minimal dewatering is likely to be required for Upperchurch Windfarm.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-6, **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 predominately 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.

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 Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.3.2.2).

11.3.4.4 Description and Rationale for Excluded (scoped out) Impacts

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

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

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

11.3.5 Mitigation Measures for Impacts to Local Groundwater Bodies

Mitigation measures were incorporated into the UWF Grid Connection project design, including the Project Design Measures. No additional mitigation measures are required as the topic authors conclude that **significant impacts are not likely to occur Local Groundwater Bodies** as a consequence of the UWF Grid Connection.

11.3.6 Evaluation of Residual Impacts to Local Groundwater Bodies

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Local Groundwater Bodies above (Section 11.3.4) – i.e. **imperceptible**.

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

The UWF Grid Connection Environmental Management Plan also includes Best Practice Measures (BPM), which although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

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

GC-BPM-05	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-06	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals

These Best Practice Measure form part of the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

11.3.7.1 Surface Water Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Surface Water Management Plan. Water quality and the existing drainage regime will be managed under the Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection. This Surface Water Management Plan (SWMP) provides the water management framework for the appointed Contractors and Sub-contractors and it incorporates the mitigating principles described in this EIAR (particularly in this Chapter 11 – Water) to ensure that construction works are carried out with minimal impact on the surface water environment and in accordance with the mitigation measures and project design commitments made in the EIAR.

The Surface Water Management Plan is part of the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

11.3.8 Summary of Impacts to Local Groundwater Bodies

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

Table 11-29: 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	*Section 11.3.4.1*	*Section 11.3.4.2*	*Section 11.3.4.3*
Project Life-Cycle Stage	Construction	Construction	Construction
UWF Grid Connection (direct effects)	**Imperceptible**	**Imperceptible**	**No Impact**
UWF Grid Connection (Cumulative effects)	**Imperceptible**	**Imperceptible**	**No Cumulative Impact**
Element 2: UWF Related Works	Imperceptible	No Impact	No Impact
Element 3: UWF Replacement Forestry	No Likely Impacts/No Potential for Impact Evaluated as Excluded – see Section 11.3.2.2.1		
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		
Cumulative Impact			
Whole UWF Project Effect	**Imperceptible**	**Imperceptible**	**Imperceptible**

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

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Local Groundwater Bodies with either the UWF Grid Connection of the Other Elements of the Whole UWF Project (see Section 11.3.2.2).

11.4 Sensitive Aspect No.3: Local Wells & Springs

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

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

11.4.1 BASELINE CHARACTERISTICS of Local Wells & Springs

11.4.1.1 STUDY AREA for Local Wells & Springs

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

Table 11-30: UWF Grid Connection Study Area for Local Wells & Springs

Study Area for Local Wells & Springs	Justification for the Study Area Extents
50m corridor, either side of the construction works area	Due to the shallow depth and temporary nature of the excavations associated with the construction works, the potential for impacts to local wells/springs is limited to physical contact with the well head/source or *localised* (15-20m) changes to surface water runoff/groundwater flow or *localised* contamination of the source by fuel/oil spills/cement-based compounds.

11.4.1.2 Baseline Context and Character of Local Wells & Springs in the UWF Grid Connection Study Area

As per Chapter 12: Air, there are c.317 No. residences and 17 No. community facilities within 100m of the UWF Grid Connection (primarily the 110kV UGC). Surveys of the 110kV UGC route undertaken as part of the studies for Chapter 14: Material Assets (Built Services) also identified public water mains along the entire length of the 110kV UGC.

As described below there are 11 wells within 100m, 10 No. of which are within 50m of construction works.

Source Protection Zones & Public Supply Wells: Based on the GSI well database, there are no mapped source protection zones (relating to group schemes or public supplies) mapped within ~3km of the UWF Grid Connection Study Area. However, there are public groundwater supply wells along the route of the 110kV UGC (referred here to as GW1 – GW3). No source protection zones have been completed to date for these wells but the 110kV UGC route is likely to be within the groundwater catchment to these wells. These 3 no. wells (GW1 – GW3), which are used as an augment supply for the Newport Regional Water Supply, are located in a compound adjacent to the local road in Castlewaller townland where the route of the 110kV UGC passes along the local public road (refer to Figure GC 11.4). The wells are located within 12m of the construction works area of the 110kV UGC. The authors (HES) previously completed an audit of this source for Irish Water (for a non-related project) and are therefore familiar with the wells and plant layout.

GSI Wells: A search of the GSI database for wells (50m mapped accuracy) found that there are 3 no. GSI wells within 50m downslope of UWF Grid Connection works (GSI Ref: 1715SEW030, 1715SEW033, 1715NEW064). The location of the GSI mapped wells is identified on Figure GC 11.4.

Other Private Wells: However, the GSI well database is not exhaustive in terms of the locations of all wells in the area as the database relies on the submission of data by drillers and the public etc. Consultation, in the form of door to door surveys, was untaken with local residents along the 110kV UGC route. The survey concluded that the vast majority of residents, public and community facilities are supplied by public mains. During the door to door survey, 1 No. private domestic well (GW4) was identified at 100m distance from the 110kV UGC on the Regional Road R503 and 3 No. private domestic wells and an old unused pump at the side of the road (GW5 – GW8), were identified within 50m of the 110kV UGC route. The location of the private wells identified during the door to door survey are identified on Figure GC 11.4. All of these 5 No. wells (including the old pump) are located downslope of the works.

11.4.1.3 Importance of Local Wells & Springs

The sources identified during house to house calls are all reported to be bored wells, and they are generally used as domestic supplies. The public groundwater supply wells are used as an augment supply for the Newport Regional Water Supply.

11.4.1.4 Sensitivity of Local Wells & Springs

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

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

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

11.4.1.6 Receiving Environment (the Baseline + Trends)

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

11.4.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.4.2.1 Cumulative Evaluation Study Areas

11.4.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

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

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

The study is illustrated on Figure CE 11.4 UWF Grid Connection Cumulative Evaluation Study Area for Local Wells and Springs.

11.4.2.1.2 Whole Project Cumulative Evaluation Study Area

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

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

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 11.4.2.2.1 below.

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 11-32 and illustrated on Figure WP 11.4 Whole Project Study Area for Local Wells and Springs.

Table 11-31: Whole Project Cumulative Evaluation Study Area for Local Wells & Springs

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	100m corridor, either side of construction works area from construction work area boundaries for Other Elements.	A conservative 100m study area is used to identify houses and buildings which may have local private well/spring water supplies
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

11.4.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Local Wells & Springs also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Local Wells & Springs with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.20).

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

11.4.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Local Wells & Springs

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Local Wells & Springs. The results of this evaluation are included in Table 11-33. The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 11.4. The baseline character of the areas around these Elements is described in Section 11.4.2.3.

Table 11-32: 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 the absence of any wells within 50m downslope of works areas. Based on the GSI well database, there are no source protection zones (relating to group schemes or public supplies) mapped in the study areas. A search of the GSI database for wells (50m mapped accuracy) within 100m of the UWF Related Works identified only 4 no. wells • mapped well 1715NEW064 (GSI Ref) at Knockcurraghbola Commons, • mapped well 1715NEW063 (GSI Ref) at Knockcurraghbola Commons, • mapped well 1715NEW065 (GSI Ref) at Foilnaman townland, and • mapped well 1715NEW108 (GSI Ref) at Knockcurraghbola Commons These 4 no. bored wells are located up-gradient of the construction works areas and therefore cannot be impacted. 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 regarding the nature of their water supply and its location. There are 5 wells within 100m of the UWF Related Works, however, only 3 No. of these wells are within 50m of the UWF Related Works and all are located upslope of the works area and therefore no impacts are anticipated. The location of these wells is identified on Figure WP 11.4.
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects due to the absence of any wells within 50m of the afforestation lands.
Element 4: Upperchurch Windfarm (UWF)	Evaluated as excluded: No potential for effects due to the absence of any wells within 50m of construction works. The closest well is GSI mapped well 1715NEW108, which is located up-gradient of Site Entrance No.6, in Knockcurraghbola Commons townland, therefore this well will not be affected

	by the works. The location of the well is identified on Figure WP 11.4.
Element 5: UWF Other Activities	Evaluated as excluded: No likely effect/Neutral effect/No potential for effects due to: • The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no water quantity or quality effects to Local Wells & Springs are likely. • Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore no water quantity or quality effects to Local Wells & Springs are expected. • Monitoring Activities do not require any major construction activities. Therefore, no surface water or groundwater impacts are expected. Once off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality. • During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore there is no potential for impacts to Local Wells & Springs.

11.4.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.4.2.3.1 Element 2: UWF Related Works

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

11.4.2.3.2 Element 3: UWF Replacement Forestry

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

11.4.2.3.3 Element 4: Upperchurch Windfarm

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

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 11.4.2.2

11.4.3 PROJECT DESIGN MEASURES for Local Wells & Springs

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

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

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

The Project Design Measures outlined in Table 11-35 are relevant to the Environmental Factor, Water, and in particular to the sensitive aspect **Local Wells & Springs**.

Table 11-33: UWF Grid Connection Project Design Measures relevant to Local Wells & Springs

PD ID	Project Design Environmental Protection Measure (PD)
PD05	At the Mountphilips Substation site, construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted. A speed limit of 25km/hr for all traffic/machinery will be implemented at the Mountphilips Substation site. Outside of Mountphilips Substation site, all construction will be restricted to the paved road surfaces or built surfaces along the 110kV UGC. A speed limit of 50km/hr for all delivery and construction traffic will be implemented on Local Roads ('L' roads).
PD16	No refuelling of plant or equipment will be permitted within 100m of identified water supply wells
PD17	At Mountphilips Substation, water for operational stage welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site.
PD23	All Joint Bays for the 110kV UGC will be located at least 50m from a Class 1 or Class 2 watercourse and at least 25m from Class 3 or Class 4 watercourses.
PD24	Outside of the Mountphilips Substation site, where dewatering of trenches or excavations is required for the 110kV UGC, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD34	Only precast concrete culverts or structures will be used at the watercourse crossing locations at Mountphilips Substation site and for any culvert replacements along the 110kV UGC. Only precast concrete chambers will be used at Joint Bay locations. No batching of wet cement will take place on-site.
PD35	Concrete pours will be required for the 110kV UGC cables trench. Only chutes will be washed out at the works locations into the cable trench, with the washout of the tank taking place at the concrete supplier depot. Concrete chute washouts within the SAC boundary will take place into designated bins for removal to the designated concrete wash settlement pond at the Mountphilips Substation site.
PD42	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. The Environmental

	Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD43	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound at the Mountphilips Substation site. All fuel will be stored in bunded, locked storage containers. The designated storage location will be greater than 100m from a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored at the designated location in the temporary compound and all operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD44	Overnight parking of plant and machinery will only be permitted at the temporary compound at the Mountphilips Substation site and at a distance greater than 50m from watercourses.

Local Wells & Springs

Sensitive Aspect

Topic **Water**

11.4.4 EVALUATION OF IMPACTS to Local Wells & Springs

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

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

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

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

11.4.4.1 Description and Rationale for Excluded (scoped out) Impacts

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

Table 11-35: 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	SW Runoff GW Flowpaths	Surface water and groundwater Contamination from Oils, Fuels and Chemicals	Rationale for Excluding: no likely impact Potential for impacts relates to UWF Grid Connection only, as there are no wells within 50m downslope of UWF Related Works or Upperchurch Windfarm works. No likely impact of UWF Grid Connection, due to the fact that all plant and machinery will be working on an impermeable road surface, any minor spills or leaks are unlikely to percolate down into the underlying aquifer and flow towards these wells or springs (surface water more at risk). In addition, confirmatory house to house calls will be conducted prior to the commencement of UWF Grid Connection works to confirm the location of any possible new wells that might be installed in the intervening period. No refuelling of plant or equipment will be permitted within 100m of known/confirmed wells (Project Design Measure).
Use of Cement Based Compounds	1	SW Runoff GW Flowpaths	Surface water and groundwater Contamination from Cement Based Compounds	Rationale for Excluding: no likely impact The use of cement for the UWF Grid Connection works within 50m of 10 no. downslope wells (including the 3 no. Newport RWS wells) 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. Potential for impacts relates to UWF Grid Connection only, as there are no wells within 50m downslope of UWF Related Works or within 100m of Upperchurch Windfarm works.
Excavation Dewatering (i.e. cable trench de-watering)	1	GW Flowpaths	Groundwater level and flow impacts	Rationale for Excluding: no likely impact Due to the shallow nature of the excavation works (1.25m) it is not expected that the excavation of a shallow trench along the carriageway of a public road will impact on groundwater flows/levels in the groundwater catchment to these wells as inflows to the well are most likely from deeper bedrock.
Operational Stage Effects				
Rationale for Excluding: no likely impact due to the absence of excavations and the minimal volumes of oils which will be present on site during maintenance works.				

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

Water

Topic

11.4.5 Mitigation Measures for Impacts to Local Wells & Springs

Mitigation measures were incorporated into the UWF Grid Connection project design. No additional mitigation measures are required as the topic authors conclude that **no impacts are likely to occur to Local Wells & Springs** as a consequence of the development of the UWF Grid Connection.

11.4.6 Evaluation of Residual Impacts to Local Wells & Springs

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Grid Connection (Section 11.4.4), i.e. **no impacts are likely to occur.**

11.4.7 UWF Grid Connection Environmental Management Plan

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

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

The Project Design measures will be implemented by the Project Manager and the main Contractor during the construction stage, under the Environmental Management Plan for the UWF Grid Connection (EMP). The EMP is appended to this EIA Report as Volume D.

The EMP will be an important contract document for the main construction contractor (Contractor) who will be contractually obliged to comply with the EMP. An Environmental Clerk of Works will be appointed, who will be independent of the construction Contractor, and it will be the responsibility of the Environmental Clerk of Works to monitor the compliance of the Contractor with the EMP through liaising with the Construction Site Manager and the Project Manager, monitoring construction works on a daily basis and by carrying out regular audits on EMP compliance. The Environmental Clerk of Works will be resouced to employ a team of environmental specialists including a Site Ecologist, Site Hydrologist and a Invasive Species Specialist.

11.4.7.1 Surface Water Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Surface Water Management Plan. Water quality and the existing drainage regime will be managed under the Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection. This Surface Water Management Plan (SWMP) provides the water management framework for the appointed Contractors and Sub-contractors and it incorporates the mitigating principles described in this EIAR (particularly in this Chapter 11 – Water) to ensure that construction works are carried out with minimal impact on the surface water environment and in accordance with the mitigation measures and project design commitments made in the EIAR.

11.4.8 Summary of Impacts to Local Wells & Springs

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

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

Impact to Local Wells & Springs	**No Likely Impact** **Evaluated as Excluded**
Evaluation Section	*Section 11.4.4.1*
Project Life-Cycle Stage	n/a
UWF Grid Connection	**No likely Impacts**
Element 2: UWF Related Works	No potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Element 3: UWF Replacement Forestry	No potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Element 4: Upperchurch Windfarm	No potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Element 5: UWF Other Activities	No potential for impacts Evaluated as Excluded, see Section 11.4.2.2.1
Cumulative Impact	
Whole UWF Project Effect	No Potential for Cumulative Impacts

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

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Local Wells & Springs with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.4.2.2).

11.5 Sensitive Aspect No.4: Lower River Shannon SAC

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

11.5.1 BASELINE CHARACTERISTICS of Lower River Shannon SAC

11.5.1.1 STUDY AREA for Lower River Shannon SAC

The study area for Lower River Shannon SAC in relation to the UWF Grid Connection is described in Table 11-39 and illustrated on Figure GC 11.5: UWF Grid Connection Study Area for Lower River Shannon SAC (Volume C3 EIAR Figures).

Table 11-37: UWF Grid Connection Study Area for Lower River Shannon SAC

Study Area for Lower River Shannon SAC	Justification for the Study Area Extents
The EPA sub-catchments of the Newport [Tipperary]_SC_010, Kileengarrif_SC_010, and Bilboa_SC_010 within the regional Mulkear River catchment • Newport[Tipperary]_SC_010, • Dead_SC_010, • Kileengarrif_SC_010, • Bilboa_SC_010, • Mulkear_SC_010, • Mulkear_SC_020, • Shannon[Lower]_SC_090	Defined by regional topography and drainage towards the SAC. Note: The Mulkear River catchment is the Lower Shannon & Mulkear Catchment Hydrometric Area HA25D excluding Shannon [Lower] _SC_100 sub-catchment and Shannon [Lower] _SC_080 sub-catchment. It is referred to as the Mulkear River Catchment throughout this sensitive aspect Section 11.5

11.5.1.2 Baseline Context & Character of Lower River Shannon SAC in the UWF Grid Connection Study Area

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

The Lower River Shannon is a designated SAC and contains protected Annex l habitats and Annex II species. Some of these plant habitats and animal species depend on the quality of the water within the SAC, and therefore in order to facilitate the evaluation of effects on protected habitats and species, the existing quality and characteristics of the waterbodies within the SAC and the potential for UWF Grid Connection to affect the quality of water within the SAC is evaluated in this Water chapter section. The potential for impacts to the protected species of plants and animals is evaluated in Chapter 8: Biodiversity (see Section 8.2: European Sites and Section 8.4: Aquatic Habitats & Species).

Overlap with the SAC Boundary

The Mountphilips Substation site and the majority of the 110kV UGC (29km of the total 30.5km) are located within the Mulkear River catchment of the Lower River Shannon SAC catchment area. The UWF Grid Connection (110kV UGC) is located within the boundary of the Lower River Shannon SAC at six locations, over a total distance of 1025m, as follows;

- 190m along a section of the local public road L6013-0 to the north of Newport;
- 230m along a section of local public roads L2156-0 and L2157-0 on either side of, and over Rockvale Bridge. Rockvale Bridge crosses the Newport River, to the north of Newport town, at Watercourse Crossing W7;
- 100m, 80m and 390m sections along the Regional Limerick to Thurles Road R503 to the east of Rear Cross; and
- 35m along a section of the Regional Road R503 at Anglesey Bridge, near Kilcommon. Anglesey Bridge crosses over the Bilboa River, to the south of Kilcommon village, at Watercourse Crossing W53.

All trenching works at the Rockvale Bridge and Anglesey Bridge will be carried out in the bridge structure. No instream works and no works on the lands below the bridges will be required. All works will be carried out from the bridge structures.

All construction works on the public road, including where works overlap the SAC boundary, will be carried out in the public road pavement and no instream works, and no works in the verges or adjacent lands will occur.

Water Sub-Catchments within the UWF Grid Connection Study Area

The UWF Grid Connection Study Area comprises the following sub-catchments within the Lower Shannon & Mulkear Catchment Hydrometric Area HA25D - Newport [Tipperary]_SC_010, Kileengarrif_SC_010, Bilboa_SC_010, Dead_SC_010, Mulkear_SC_010, Mulkear_SC_020, and the Shannon [Lower]_SC_090. This area is referred to as the Mulkear River Catchment throughout this Section 11.5.

The UWF Grid Connection is located within the Newport [Tipperary]_SC_010, Kileengarrif_SC_010, and Bilboa_SC_010 Sub-Catchments.

Watercourse Crossings within the UWF Grid Connection Study Area

In total, within the River Shannon catchment, there are 63 no. watercourse crossings along the 110kV UGC route. 3 no. of the watercourse crossings are located at the Mountphilips Substation site, while the remaining 60 no. watercourse crossings are existing bridges and culverts along the route of the 110kV UGC, which is entirely along the public road, where the 110kV UGC is located in the Mulkear River Catchment.

All 3 no. watercourse crossings at the Mountphilips Substation site will require instream works, 2 no. of these watercourses (W1 and W3) are streams and evaluated as being Class 2 watercourses with fisheries value. The remaining watercourse, W2, is a drain and evaluated as being Class 3 sub-optimal fisheries value.

The 60 no. watercourses along the 110kV UGC comprise 15 no. bridges and 45 no. culverts under the public road. No instream works are required at the bridges or at 32 no. of the culverts. At the remaining 12 no. watercourse crossings, the existing culverts may require replacement during construction works. 11 of these 12 no. culverts are evaluated at being either Class 3 or Class 4 with sub-optimal or no fisheries value.

Existing Water Quality Monitoring Data and WFD Waterbody Status

Based on the EPA mapping (www.catchments.ie), the main watercourses within the Newport[Tipperary]_SC_010, Kileengarrif_SC_010 and Bilboa_SC_010 sub catchments are the Newport River (in the Newport_040 local surface water body), Clare River (in the Annagh_030 local surface water body) and the Bilboa River (in the Bilboa_020 local surface water body), which have a Good to High Status in terms of EPA Q-Values with a *Not at Risk* risk rating. The exception to this is the Inch (Bilboa)_010 which is reported to be At Risk of not meeting the Water Framework Directive objectives due to agriculture and forestry related effects.

Flood Risk

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 and this report is attached as Appendix 11.3 Flood Risk Assessment. A summary of the flood risk assessment within the Mulkear River Catchment is provided below.

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. The Mountphilips Substation site is also not located within a mapped fluvial flood zone.

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 W5, W7 (Newport River), W8, W9 (Small River), W33, W36 (Clare River), W39, W49 and W53 (Bilboa River). Access to these crossing locations will only be required during the construction stage (no new permanent infrastructure is required at these watercourses crossing locations). The Mountphilips Substation site is also not located within a mapped fluvial flood zone.

11.5.1.3 Importance of Lower River Shannon SAC

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

11.5.1.4 Sensitivity of Lower River Shannon SAC

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

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

Based on the EPA database, 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.

11.5.1.6 Receiving Environment (the Baseline + Trends)

Due to the slow rate of change, it is expected that the status of waterbodies will be the same at the time of construction (2020/2021). However, 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.

Lower River Shannon SAC

Sensitive Aspect

11.5.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.5.2.1 Cumulative Evaluation Study Areas

11.5.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

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

UWF Grid Connection Cumulative Evaluation Study Area for Lower River Shannon SAC	Justification for the Study Area Extents
The regional Mulkear River catchment, comprising the following EPA Sub-Catchments: • Newport[Tipperary]_SC_010, • Kileengarrif_SC_010, • Bilboa_SC_010, • Dead_SC_010, • Mulkear_SC_010, • Mulkear_SC_020, • Shannon[Lower]_SC_090	Defined by regional topography and drainage towards the SAC.

The study is illustrated on Figure CE 11.5: UWF Grid Connection Cumulative Evaluation Study Area for Lower River Shannon SAC (Volume C3 EIAR Figures).

11.5.2.1.2 Whole Project Cumulative Evaluation Study Area

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

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

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 11.5.2.2.1 below.

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 11-40 and Figure WP 11.5: Whole Project Study Area for Lower River Shannon SAC (Volume C3 EIAR Figures).

Table 11-38: Whole Project Cumulative Evaluation Study Area for Lower River Shannon SAC

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	The regional Mulkear River catchment, comprising the following EPA Sub-Catchments: • Newport[Tipperary]_SC_010, • Kileengarrif_SC_010, • Bilboa_SC_010, • Dead_SC_010, • Mulkear_SC_010, • Mulkear_SC_020, • Shannon[Lower]_SC_090	The Mulkear River is one of the regional catchments in which all of Elements of the Whole UWF Project are located. The Mulkear River catchment drains to the Lower River Shannon SAC. Extending the scoping area beyond the Mulkear River catchment would mean that the whole of the River Shannon catchment would be included and 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 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5:		

Water

Topic

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	The regional Mulkear River catchment, comprising the following EPA Sub-Catchments:	The Mulkear River is one of the regional catchments in which all of Elements of the Whole UWF Project are located. The
UWF Other Activities		

11.5.2.2 Scoping for Other Projects or Activities & Potential for Impacts

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 Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.21).

The results of this scoping exercise are that: Newport Town Park (consented), Castlewaller Windfarm (consented) and Bunkimalta Windfarm (potential) have been scoped in for evaluation of cumulative effects to Lower River Shannon SAC.

11.5.2.2.1 Potential for Other Elements or Other Projects to cause 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 11-41.

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

Table 11-39: 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 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects due to the location of the UWF Replacement Forestry outside of the regional Mulkear River catchment.
Element 4: Upperchurch Windfarm	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral effect/No potential for effects due to: • The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no hydrological / water quality effects are likely. • Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore no surface water or groundwater impacts are expected. • Monitoring Activities do not require any major construction activities. Therefore, no surface water or groundwater impacts are expected. Once

	off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality. • During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of Upperchurch Windfarm, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore no water quality effects are expected.
Other Projects or Activities	
Bunkimalta Windfarm Castlewaller Windfarm Newport Town Park	Yes, included for the evaluation of cumulative sedimentation effects. Evaluated as excluded: Neutral cumulative water quality effects from 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 Newport Town Park NIS, Castlewaller Windfarm EIS, and assumed to form part of any future Castlewaller Windfarm grid connection or Bunkimalta Windfarm EIAR, and due to No potential for cumulative morphological effects due to separation distance, no increased flood risk associated with the Other Projects due to location of UWF Grid Connection, and implementation of surface water drainage system.

11.5.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.5.2.3.1 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, and HW10) located in the Bilboa_SC_010 sub catchment. There is only 1 no. watercourse crossing for the UWF Related Works, within the River Shannon catchment.

11.5.2.3.2 Element 3: UWF Replacement Forestry

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

11.5.2.3.3 Element 4: Upperchurch Windfarm

In relation to the Upperchurch Windfarm, similar to the UWF Related Works, only a small portion of the Upperchurch Windfarm is located in the River Shannon catchment with only 2 no. of the 22 no. Consented UWF turbines and associated UWF Access Roads located in the Bilboa_SC_010 sub catchment.

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

11.5.2.3.4 Element 5: UWF Other Activities

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

11.5.2.3.5 Other Projects or Activities

Newport Town Park (consented): A public park in Newport town is consented by Tipperary County Council, which is also located in the Newport (Tipperary)_SC_010 sub-catchment in the Mulkear River catchment,, and downstream of the UWF Grid Connection development. The park includes excavations, groundworks. Landscaping and car-parking facilities on lands immediately adjacent to the Newport River and overlaps the boundary of the Lower River Shannon SAC. No instream works associated with the Newport Town Park project.

Castlewaller Windfarm (consented): The 16 no. turbines and 1 no. substation of this consented windfarm development are all located within the Newport (Tipperary)_SC_010 sub-catchment in the Mulkear River catchment, all upstream of the UWF Grid Connection development. The route of the associated potential grid connection is assumed in this report to be predominately within the public road corridor to Killonan Station and is also within the River Shannon Catchment, The potential grid connection route may overlap with the UWF Grid Connection along the public road L6009-0. Although it is not likely that Castlewaller Windfarm or its grid connection will be constructed during the same period as UWF Grid Connection, this Other Project is nonetheless included in the cumulative evaluation on a precautionary basis and the potential for windfarm construction works taking place during the same period as UWF Grid Connection works is evaluated. The construction of the consented windfarm will involve both instream works and works in close proximity to watercourses.

Bunkimalta Windfarm (potential): Although it is not expected that the Bunkimalta Windfarm will be constructed at the same time as Upperchurch Windfarm or UWF Grid Connection (due to the recent annulment of the Bunkimalta Windfarm planning permission following the European Court of Justice ruling C-164/17), this project and its associated gird connection are nonetheless included in the cumulative evaluation on a precautionary basis. The potential Bunkimalta Windfarm is expected to be located in the same general area (as previously proposed), upstream of the UWF Grid Connection only. The Bunkimalta Windfarm is assumed in this report to be similar to the previous application for 16 no. turbines and a substation compound. The turbines are assumed to be located within both the Kileengarrif_SC_010 sub-catchment and the Newport (Tipperary)_SC_010 sub-catchment in the Mulkear River catchment. The construction of the windfarm is assumed to involve both instream works and works in close proximity to watercourses. The grid connection (consented) associated with the potential Bunkimalta is predominately within the public road corridor to Nenagh town and is also within the River Shannon Catchment, though does is not located close to the UWF Grid Connection.

11.5.3 PROJECT DESIGN MEASURES for Lower River Shannon SAC

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

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

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

The Project Design Measures PD15 to PD33 and PD40 to PD46 set out for Local Surface Water Bodies in Section 11.2.3 are also relevant to the River Shannon SAC.

The Project Design Measures outlined in Table 11-42 were developed for the sensitive aspect **Lower River Shannon SAC**.

Table 11-40: UWF Grid Connection Project Design Measures relevant to Lower River Shannon SAC

PD ID	Project Design Environmental Protection Measure (PD)
PD20	At Mountphilips Substation site, all excavated material will be removed for temporary or permanent storage at designated berms, which will be located more than 25m away from the watercourses on Mountphilips Substation site. All storage berms will be graded and sealed following emplacement. The berms will be covered if there is a risk of erosion. Temporary silt control methods such as silt fencing will be placed around all overburden storage areas. The existing vegetative buffer between the berms and the nearest watercourses will be maintained and no works will occur in the buffer zone.
PD21	At Mountphilips Substation site, the permanent storage berms will be along the new access road and around the substation compound will be planted with local provenance native fruiting hedge species, with grasses and native flower species common to the surrounding vegetation sown along the sides of the berms. Local provenance native wildflower seed of flowering plants like clovers, vetches and knapweed will be included. Revegetation works will take place at the soonest practicable opportunity after emplacement.
PD22	Outside of the Mountphilips Substation site, there will be no storage of overburden and all excavations from road trenches will be removed to licensed waste facilities in accordance with the UWF Grid Connection Waste Management Plan. Loads of excavated material will be covered during transportation to prevent spillages of excavated material.
PD23	All Joint Bays for the 110kV UGC will be located at least 50m from a Class 1 or Class 2 watercourse and at least 25m from Class 3 or Class 4 watercourses.
PD24	Outside of the Mountphilips Substation site, where dewatering of trenches or excavations is required for the 110kV UGC, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD25	Construction works along the 110kV UGC route will cease during heavy or prolonged rainfall events, and any open trenches or excavations will be covered. Use of weathering forecasting will be undertaken in advance of works.
PD26	A phased approach will be undertaken in relation to excavations, excavation dewatering and any culvert replacement works, where these works occur within 50m of a watercourse. The phased approach will only permit one of main potential sediment producing activities (i.e. excavations, excavation dewatering or culvert replacement works), to be carried out within 50m of a watercourse, at any one

	time.
PD28	Along the 110kV UGC on the public road, where works will take place within 50m of a watercourse, additional mitigation measures will be implemented which include silt fencing and placement of sandbag arrangements along preferential surface water flowpaths on the road pavement. Following works on any particular section, any works debris will be removed from the road before the sandbags and silt fences are removed.
PD29	Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included. This will minimise/avoid the requirement for any excavation dewatering as a result of waterlogged soils or surface water runoff. None of these 110kV UGC sections are within the Lower River Shannon SAC.
PD30	Lines of silt fencing and sandbags will be erected along the edge of the road so that surface water runoff from adjacent construction works areas is captured and directed to the excavated trench, where it can be pumped and treated before being released, as per PD24.
PD31	Works to bridge parapet walls at watercourse crossings W7, W36, W53 will be carried out during dry weather, and debris netting will be fixed to the outside of the walls in order to prevent any debris falling into the watercourse below.
PD33	All new permanent watercourse culverts at the Mountphilips Substation site and any replacement culverts along the public road for the 110kV UGC will be sized to cope with a minimum 100-year flood event.
PD34	Only precast concrete culverts or structures will be used at the watercourse crossing locations at Mountphilips Substation site and for any culvert replacements along the 110kV UGC. Only precast concrete chambers will be used at Joint Bay locations. No batching of wet cement will take place on-site.
PD35	Concrete pours will be required for the 110kV UGC cables trench. Only chutes will be washed out at the works locations into the cable trench, with the washout of the tank taking place at the concrete supplier depot. Concrete chute washouts within the SAC boundary will take place into designated bins for removal to the designated concrete wash settlement pond at the Mountphilips Substation site.
PD36	The sections of 110kV UGC trenches that overlap the Lower River Shannon SAC will be lined with an impermeable geotextile material to prevent potential migration of cement from the trench base or sides into the SAC.
PD37	In addition to PD22, there will be no storage of overburden within the Lower River Shannon SAC.
PD38	110kV UGC works outside of Mountphilips Substation site will be carried out entirely on paved roads and where the 110kV UGC crosses watercourses, the works will be carried out over the existing bridges and over/under existing culverts. No in-streams works are proposed at any watercourse crossing points (including the Newport River and Bilboa River crossings) within the boundary of the Lower River Shannon SAC and therefore there will be no placement of cement or other materials within the river channels or on the river banks within the SAC.
PD39	In addition to PD42, there will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within 100m of the boundary of the Lower River Shannon SAC.
PD40	In addition to PD29, all 110kV UGC works within the boundary of the Lower River Shannon SAC will only be completed during dry weather in the dryer months of the year – i.e. February to September included.
PD41	The instream works at W1, W2 and W3 at Mountphilips Substation site, and the culvert replacement works at the 13 existing culverts on the public road, and all works (including concrete placement) within the boundary of the Lower River Shannon SAC, will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice Measures are followed.
PD42	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.

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PD43	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound at the Mountphilips Substation site. All fuel will be stored in bunded, locked storage containers. The designated storage location will be greater than 100m from a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored at the designated location in the temporary compound and all operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD44	Overnight parking of plant and machinery will only be permitted at the temporary compound at the Mountphilips Substation site and at a distance greater than 50m from watercourses.
PD45	The horizontal directional drilling works at W8 and W9 will be carried out by an experienced Drilling Contractor and supervised and managed by a competent and experienced Mud Engineer who understands the technicalities and challenges of drilling works. The Mud Engineer will advise the Construction Manager on the selection of competent drillers for the HDD works; monitor the watercourse bed during drilling works, and will supervise the drilling works including the drilling pressures and the implementation of any contingency measures. From a surface water quality protection perspective, the area around the launch/reception pit, bentonite batching, pumping and recycling plant will be bunded using appropriate terram geotextile and/or sandbags in order to contain any spillages. Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized water tight skip before being taken off-site to a suitably licensed waste facility. In the event of a break-out occurring, the Environmental Emergency Response Procedure for Frac-Out will be implemented which includes the following contingency measures; In the event of break-out occurring in the river bed, the rig will immediately shut off the pumps and the drilling assembly will be pulled off to reduce annular pressures; In the event of break-out on the road an excavator will be available to dig a pit to contain fluid with vacuum trucks/pumps available to transfer drill fluid from the containment point back to the recycling point; and in either scenario, drilling fluid additives designed to plug the formation will be introduced to the circulation system and let set. Environmental Emergency Response Procedures are included in the UWF Grid Connection Environmental Management Plan (see Volume D).
PD46	All construction works will be monitored on a daily basis by the Environmental Clerk of Works and by members of the Environmental Clerk of Works team (for example Site Ecologist) as required, for compliance with the Environmental Commitments, which include the Project Design Measures, as per the UWF Grid Connection Environmental Management Plan (see Volume D).
PD47	Surface water quality monitoring of the main watercourses downstream of the works will be carried out to ensure that the downstream water quality status in the receiving water is maintained and that there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009. Where non-compliance in water quality is measured or recorded, works will stop until the issue is resolved. The surface water monitoring locations and sampling programme are defined in the Surface Water Management Plan for UWF Grid Connection. The Surface Water Management Plan is part of the UWF Grid Connection Environmental Management Plan (see Volume D).
PD48	The new permanent cross structures at the Mountphilips Substation site and the replacement culvert at W14 along the R503 will be bottomless or clear spanning.
PD49	In-stream works at Mountphilips Substation site and culvert replacement works at W14 along the R503 Regional Road will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
PD50	Culvert replacement works along the 110kV UGC will not be undertaken without isolation of flow within the watercourse. Isolation of flow will be achieved through the use of sandbags filled with clean, washed sand. Any fish within the isolated section will be removed prior to works commencing. This will require the engagement of licensed fisheries personnel to deplete the works area using electrofishing and, following collection of biometrics, transferred immediately downstream of the crossing point and placed back in the water. The water will then be isolated from the works by over pumping using a flume

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	(pipe), with deflector plates used on the downstream side of the flume to reduce the hydraulic power of the water. Construction works at the crossing will be followed by site-specific reinstatement measures to ensure the equilibrated restoration of flow character and morphology within the affected reach to achieve baseline character and avoid any deterioration in morphology as required under the Water Framework Directive (WFD). Measures will include: bank stabilization measures, reinstatement of bank slope and character; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and the use of deflector plates during the restoration of flow. As per PD41, culvert replacement works will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice are followed. These measures will ensure that the baseline character is maintained and will ensure that a deterioration in morphology is avoided, as required under the Water Framework Directive. This in turn will protect Aquatic Ecology.

Cumulative Information:

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

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11.5.4 EVALUATION OF IMPACTS to Lower River Shannon 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 and Other Projects or Activities are identified and evaluated.

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

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

Table 11-41: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Surface water quality impacts due to earthworks (excavations and overburden storage)	*Surface water quality impacts due to tree felling (in conifer plantations – Other Elements only), (Construction Stage)*
Surface water quality impacts from dewatering of excavations (Construction Stage)	*Increased flood risk (Operational Stage)*
Surface water quality impacts from watercourse crossing works (Construction Stage)	*Surface Water Quality Impacts due to suspended solid input from permanent hardstanding surfaces (Operational Stage)*
Surface water quality impacts during directional drilling works (Construction Stage)	*Decommissioning Stage Effects*
Water quality impacts from fuels, oils and chemicals, (Construction Stage)	
Water quality impacts from cement-based compounds, (Construction Stage)	
Cumulative Impact Evaluation (with Other Projects): Surface Water Quality Effects from Suspended Solids	

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 11.5.4.1 to 11.5.4.6.**

Cumulative evaluation with Other Projects is presented in Section 11.5.4.7.

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections in Section 11.5.4.8.

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Earthworks and groundwork
Cumulative Impact Source: Earthworks and groundwork in relation to Other Elements
Impact Pathway: Runoff and surface water flowpaths

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

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
The potential for water quality effects will arising during earthworks required for the Mountphilips Substation and End Masts, new permanent access road, widened entrance, drainage system and the temporary compound at the Mountphilips Substation site and the cable trench and joint bays for the 110kV UGC (29 km of 30.5km are within the catchment area of the Lower River Shannon SAC),

In total, up to 5,000m^3 of overburden from excavations at Coole and Mountphilips (for Mountphilips Substation, End Masts, access road, entrance, and drainage system at the Mountphilips Substation site and also 110kV UGC between the Site Entrance in Coole to the Mountphilips Substation) will be permanently stored within the construction works area at the Mountphilips Substation site as linear berms alongside the new access road and around the substation compound. Erosion of these storage areas potentially could result in surface water quality impacts on the downstream SAC.

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

The potential for effects is considerably reduced by the carrying out of trenching works and construction of joint bay chambers during dry weather in the dryer months of the year – i.e. February to September included (when ground conditions are typically dryer) along the sections of the 110kV UGC route along the public road where there are numerous smaller watercourses being crossed that drain directly into the main watercourses. Particular areas to note include Clare River (W13 – W20, and W32 and W34) and works within the boundary of the SAC (Project Design Measure).

Due to the scheduling of works and the fact that there will be no storage of excavated material within, or in close proximity (6km upstream) to, the SAC boundary, 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 22km) within

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the Mulkear River catchment;

- All excavated material from public roads as a result of the UWF Grid Connection will be removed to landfill, therefore there will be no overburden of material arising from excavation in the public road.
- Approx. 5,000m^3 (from excavations at Coole/Mountphilips) will be stored at Mountphilips Substation in the form of a linear berm around the substation and along new access road. Berms will be seeded at the soonest practicable opportunity (Project Design Measure). Mountphilips Substation excavation works are located c. 6km upstream of the Lower River Shannon SAC
- The majority of the watercourses intercepted by the works area (74%) are drains or marginal headwater watercourses with 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, impacts on local surface water bodies are expected to be Imperceptible, and therefore effects on the Lower River Shannon SAC are expected to be of lower significance due to the larger downstream distance and dilution capacity of local surface water bodies;
- All works within the SAC will be confined to public road surface, and where works traversing the Rockvale Bridge and Anglesey Bridge, will be confined to the bridge;
- All effects will be brief to temporary in duration and reversible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects with the Other Elements in the catchment of the Lower River Shannon SAC relates to the Inch (Bilboa)_010 local surface water body which form part of the Bilboa_SC_010 sub-catchment. In the Bilboa_SC_010 sub-catchment, works involving excavations will be required for UWF Grid Connection, UWF Related Works and Upperchurch Windfarm. No storage of overburden material will be required for UWF Grid Connection in the Bilboa_SC_010 sub-catchment as all material excavated from the 110kV UGC trench will be removed to a licensed waste facility.

Temporary and permanent storage of excavated material (overburden) will be required for UWF Related Works and Upperchurch Windfarm where total overburden storage within the Bilboa_SC_010 sub-catchment will be: up to 9,080m^3 of permanently stored overburden and up to 11,400m^3 temporarily stored overburden. It is possible that erosion of these storage areas could result in surface water quality impacts locally. Due to the transient and spread out nature of the UWF Grid Connection, Upperchurch Windfarm and UWF Related Works and the fact that most of the local watercourses, in the Bilboa_SC_010 sub-catchment, are drains or marginal watercourses (Class 3 or Class 4), the magnitude of impact is considered to be Negligible.

The potential for Bunkimalta Windfarm, Castlewaller Windfarm and Newport Town Park to cause cumulative effects with UWF Grid Connection, is evaluated in Section 11.5.4.7 Cumulative Impacts Evaluation.

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;
- In-combination effects on surface water quality within Bilboa_SC_010 sub-catchment, within the catchment of the Lower River Shannon SAC, are likely to be negligible due to the small extent of in-combination works in this catchment – i.e. the majority of UWF Related Works, Upperchurch Windfarm and UWF Replacement Forestry are located in the Suir catchment, which limits the potential for cumulative impacts.
- Temporary nature of the works

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

Element 2: UWF Related Works

Impact Magnitude: UWF Related Works within the Mulkear River catchment will include 1.7km of Internal Windfarm Cabling (of the total 17.9km) and Haul Route works (HW7 - HW10) at 3 no. locations which mainly involves public road widening.

Temporary storage of overburden relating to excess material excavated from the Internal Windfarm Cabling within the Whole Project Cumulative Study Area (Mulkear River catchment) will amount to approximately

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498m^3 of material. No permanent storage of overburden is proposed within the Mulkear River catchment.
Due to the relatively small scale of the UWF Related Works within the River Shannon catchment, the magnitude of impact is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- The small footprint area of the construction works within the regional Mulkear River 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 Whole Project Cumulative Study Area (Mulkear River 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 3: UWF Replacement Forestry– *N/A, evaluated as excluded, see Section 11.5.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
Temporary and permanent storage of excavated material (overburden) within the Bilboa_SC_010 sub-catchment will be: up to 9,080m^3 of permanently stored overburden and up to 10,902m^3 temporarily stored overburden. Based on Chapter 15 (Hydrology Chapter, see Reference Documents Volume F8) and the Sediment and Erosion and Control Plan from the 2013 EIS, release of sediment during the construction phase is likely to have a negative effect on the River Shannon and its tributaries.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

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

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Newport Town Park, Castlewaller Windfarm and potential Bunkimalta Windfarm
- Please refer to Section 11.5.4.7 for cumulative information

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

Whole UWF Project Effect

Cumulative Impact Magnitude:
Excavations for UWF Grid Connection, UWF Related Works and Upperchurch Windfarm will take place with the catchment area of the Lower River Shannon SAC. The majority of these works will relate to the UWF Grid Connection works. However, any effects will be brief to temporary, and the UWF Grid Connection works in the catchment generally comprise trenching works in public road pavements and in bridge structures. Any material arising from 110kV UGC trenching and excavations in the public road will be sent to licensed waste facilities.
UWF Related Works and Upperchurch Windfarm will not contribute significantly to works in the Mulkear River catchment, due to the fact that the majority of the UWF Related Works and Upperchurch Windfarm are located in the River Suir catchment, the cumulative magnitude of impact is expected to remain at **Negligible.**

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Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High Importance** of the SAC;
- The majority of UWF Grid Connection construction works areas are contained within the Mulkear River 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 Whole Project Cumulative Study Area (Mulkear River catchment) are more than 50m from a watercourse (there is only 1 no. watercourse crossing in the River Shannon catchment and no instream works at this crossing);
- The Upperchurch Windfarm will have a Sediment and Erosion and Control Plan, and therefore no significant effects on the Lower River Shannon SAC are anticipated; and,
- Therefore, the in-combination effects on surface water quality at the downstream Lower River Shannon SAC will be negligible.

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

- *Please refer to Section 11.5.4.7 for cumulative evaluation*

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Dewatering
Cumulative Impact Source: Excavation Dewatering in relation to Other Elements
Impact Pathway: Runoff and surface water flowpaths

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

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
The River Shannon SAC extends as far upstream as the Newport River (at Rockvale Bridge) and Bilboa River (at Anglesey Bridge) watercourse crossing locations and is also mapped along the public road at 6 locations (local roads on either side of Rockvale bridge north of Newport, a local road L6013-0 to the north of Newport, the regional road R503 at Anglesey Bridge and 3 short sections of the R503 regional road to the east of Rear Cross village).

No significant excavation dewatering is expected for the UWF Grid Connection as the route (outside of the Mountphilips Substation site) is entirely along the carriageway of public roads which has road drainage in place. The potential for effects is considerably reduced by the carrying out of trenching works and construction of joint bay chambers during the spring/summer months (when ground conditions are typically dryer) along the sections of the 110kV UGC route along the public road where there are numerous smaller watercourses being crossed that drain directly into the main watercourses. Particular areas to note include Clare River (W13 – W20) and W32 and W34 and works within the boundary of the SAC (Project Design Measure);

Regardless all pumped water, outside the Mountphilips Substation site, will be treated using a mobile water treatment train and then discharged via a silt bag (Project Design Measure), the effects are likely to be Negligible.

At Mountphilips Substation site, no significant dewatering requirement is anticipated and any pumped water will be treated and then discharged at a location away from any local watercourses (Project Design), 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).
- At Mountphilips Substation site, any pumped water will be treated and then discharged at a location away from any local watercourses (Project Design)
- No significant dewatering requirement is expected during the construction of the Mountphilips Substation itself;

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- At the 110kV UGC works locations on the public road network, all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag (Project Design);
- The route of the 110kV outside of the Mountphilips Substation site (within the Mulkear River catchment) is entirely along the carriageway of public roads and therefore significant trench dewatering is not anticipated;
- Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included. This will minimise/avoid the requirement for any excavation dewatering as a result of waterlogged soils or surface water runoff. None of these 110kV UGC sections are within the Lower River Shannon SAC. (Project Design Measure);
- Lines of silt fencing and sandbags will be erected along the edge of the road so that surface water runoff from adjacent construction works areas is captured and directed to the excavated trench, where it can be pumped and treated before being released (Project Design Measure);
- Works will not be completed during extreme or prolonged rainfall events in order reduce the risk of surface water inflows into the trench; and,
- All effects will be localised, brief to temporary in duration and reversible

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects with the Other Elements of the Whole UWF Project relates to the following local waterbodies: Inch (Bilboa)_010 local surface water body which is within the Bilboa_SC_010 sub-catchment of the larger Mulkear River catchment.

No significant excavation dewatering is expected for the UWF Grid Connection as the route is entirely located along the carriageway of public roads. Any effects are likely to be negligible. No excavation dewatering is expected for Internal Windfarm Cabling or the Upperchurch Windfarm due to the upland location of the works and based on the results of trial pit investigations at the windfarm site which had no groundwater inflows.

The potential for Bunkimalta Windfarm, Castlewaller Windfarm and Newport Town Park to cause cumulative effects with UWF Grid Connection, is evaluated in Section 11.5.4.7 Cumulative Impacts Evaluation.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC; and,
- No significant dewatering requirements are likely.

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

Element 2: UWF Related Works

Impact Magnitude:
Only 1.7km of the Internal Windfarm Cabling is located within the Mulkear River catchment, and no dewatering is expected based on the trial pits undertaken at the windfarm site which were dry.

Significance of the Impact: No Likely Impact

Rationale for Impact Evaluation:

- No dewatering with respect to the UWF Related Works is anticipated.

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) 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

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dewatering.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Only 2 no. turbines are located within the Mulkear River 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*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Newport Town Park, Castlewaller Windfarm and potential Bunkimalta Windfarm

- Please refer to Section 11.5.4.7 for cumulative information

Evaluation of Other Cumulative Impacts – Surface water quality impacts from dewatering of excavations

Whole UWF Project Effect

Cumulative Impact Magnitude:

Given that any pumped water from UWF Grid Connection will be treated and then discharged at a location away from any local watercourses (at Mountphilips Substation site), and will be treated using a mobile water treatment train and then discharged via a silt bag, and taking into account the location of the majority of the development on the public road network, with no excavation dewatering expected from the Other Elements, significant dewatering is not expected for any element of the project, and therefore the impact magnitude will be **Negligible**

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- No significant excavation dewatering is likely for any of the project elements within the Mulkear River catchment;
- All pumped water will be treated using a mobile water treatment train and then discharged via a silt bag (Project Design Measure),
- Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included. This will minimise/avoid the requirement for any excavation dewatering as a result of waterlogged soils or surface water runoff. None of these 110kV UGC sections are within the Lower River Shannon SAC. (Project Design Measure); and,
- All effects will be localized and brief to temporary in nature.

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

- *Please refer to Section 11.5.4.7 for cumulative evaluation*

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Watercourse Crossing Works
Cumulative Impact Source: Watercourse Crossing Works in relation to Other Elements
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 replacement /emplacement works within watercourses upstream of the Lower River Shannon SAC within the Mulkear River catchment.

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Instream works will be required at the 3 watercourses at the Mountphilips Substation site. Outside of the Mountphilips Site, there are 58 no. existing watercourse crossing structures along the road network. The 110kV UGC will potentially involve the replacement of 13 no. of these culverts within the Mulkear River catchment, where instream works will relate to the replacement of existing culverts in the road. Water quality effects can potentially occur downstream during the crossing works.

The potential for effects is considerably reduced by the carrying out of trenching works and construction of joint bay chambers during the spring/summer months (when ground conditions are typically dryer) along the sections of the 110kV UGC route along the public road where there are numerous smaller watercourses being crossed that drain directly into the main watercourses. Particular areas to note include Clare River (W13 – W20) and W32 and W34 and works within the boundary of the SAC (Project Design Measure);
Due to the fact that instream works largely involve culvert replacement, the assimilative capacity provided by local watercourses, the location of instream works in two separate sub-catchments, 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 majority of the watercourses (74%) intercepted by the UWF Grid Connection upstream of the SAC are drains or marginal watercourses which have typically low flows, and therefore the effectiveness of them acting as surface water flowpaths to the downstream SAC is limited;
- As assessed in Section 11.2.4, all impacts on local surface water bodies (immediately downstream of the crossings works) are only expected to be Imperceptible to Slight and therefore effects on the downstream Lower River Shannon SAC are expected to be of much lower significance because (1) the large geographical distribution of the watercourse crossings within several local surface water bodies upstream of the SAC and (2) high assimilative capacity of the rivers within the SAC downstream of the works (i.e. Newport River, Clare River and Bilboa River);
- The transient nature of the watercourse crossing works within local surface water bodies upstream of the SAC; and,
- All effects will be brief to temporary in nature and reversible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: Due to the fact that there are no instream works required for UWF Related

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Works site within the Mulkear River catchment, and no instream works required for Upperchurch Windfarm, UWF Replacement Forestry or UWF Other Activities, it is considered that there is no potential for in-combination effects with the Other Elements of the Whole UWF Project.

The potential for Bunkimalta Windfarm, Castlewaller Windfarm and Newport Town Park to cause cumulative effects with UWF Grid Connection, is evaluated in Section 11.5.4.7 Cumulative Impacts Evaluation.

Significance of the Cumulative Impact: No cumulative impact

Rationale for Cumulative Impact Evaluation:

- No instream works for the Other Elements required in the Mulkear River catchment.

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

Element 2: UWF Related Works

Impact Magnitude: There is only 1 no. watercourse crossing within the Mulkear River catchment for the UWF Related Works, however no in-stream works are required for this crossing and therefore no effects on the SAC are expected.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- There is only 1 no. watercourse crossing for the UWF Related Works in the River Mulkear River catchment, no instream works are required.

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

Element 4: Upperchurch Windfarm

Impact Magnitude: There is no watercourse crossing relating to Upperchurch Windfarm in the Mulkear River catchment. Therefore, there is no potential for impact.

Impact Evaluation: No Impact

Rationale for Impact Evaluation:

- There is no watercourse crossing relating to Upperchurch Windfarm in the Mulkear River catchment.

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Newport Town Park, Castlewaller Windfarm and potential Bunkimalta Windfarm
- Please refer to Section 11.5.4.7 for cumulative information

Evaluation of Other Cumulative Impacts – Surface water quality impacts from watercourse crossing works

Whole UWF Project Effect

Watercourse crossing works in the Regional Mulkear River catchment are only associated with the UWF Grid Connection element of the Whole UWF Project. No Instream works required for any Other Elements in the Regional Mulkear River catchment. The whole project impact magnitude will be as per UWF Grid Connection impact magnitude above – i.e. Imperceptible.
The cumulative magnitude of impact will be **Negligible**.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

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- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High Importance** of the SAC,
- Watercourse crossings works within the Mulkear River catchment are exclusively associated with the UWF Grid Connection.

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

- *Please refer to Section 11.5.4.7 for cumulative evaluation*

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Groundworks for directional drilling
Cumulative Impact Source: None – no drilling required for Other Elements
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 under the bed of the watercourse (and under the existing crossing structure) at the W8 and W9 watercourse crossings, in the Newport[Tipperary]_SC_010 sub-catchment of the Mulkear River catchment. There is a risk of indirect impacts from sediment laden runoff during the launch pit and reception pit excavation works, and from any frac-out occurrence (should it occur). The drilling locations at W8 and W9 are not located within the boundary of the Lower River Shannon SAC, which is approximately 2km downstream at its closest point.

The horizontal directional drilling works at W8 and W9 will be carried out by an experienced Drilling Contractor and supervised and managed by a competent and experienced Mud Engineer who understands the technicalities and challenges of drilling works. The Mud Engineer will advise the Construction Manager on the selection of competent drillers for the HDD works; monitor the watercourse bed during drilling works, and will supervise the drilling works including the drilling pressures and the implementation of any contingency measures. From a surface water quality protection perspective, the area around the launch/reception pit, bentonite batching, pumping and recycling plant will be bunded using appropriate terram geotextile and/or sandbags in order to contain any spillages. Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized water tight skip before being taken off-site to a suitably licensed waste facility. In the event of a break-out occurring, the Environmental Emergency Response Procedure for Frac-Out will be implemented which includes the following contingency measures; In the event of break-out occurring in the river bed, the rig will immediately shut off the pumps and the drilling assembly will be pulled off to reduce annular pressures; In the event of break-out on the road an excavator will be available to dig a pit to contain fluid with vacuum trucks/pumps available to transfer drill fluid from the containment point back to the recycling point; and in either scenario, drilling fluid additives designed to plug the formation will be introduced to the circulation system and let set. Environmental Emergency Response Procedures are included in the Environmental Management Plan for UWF Grid Connection (Project Design Measure);

Impact Quality: Negative

Evaluation of the Impact of the Subject Development – Surface water quality impacts during directional drilling works

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Given that all work will take place from the paved surface of the public road and generation of poor quality runoff is not anticipated, 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;
- The drilling locations are not located within the boundary of the Lower River Shannon SAC, which is approximately 2km downstream at its closest point;
- All work within the mapped SAC boundary will take place from the paved surface of the public road, and therefore the generation of sediment laden runoff is not expected;

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- Excavation work will only be required for the launch pit and reception pit, and will only take place in paved surfaces;
- 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);
- All runoff from the works area will be collected and will be treated using a mobile water treatment train and then discharged via a silt bag. **(**Project Design Measure**);**
- There will be no direct discharge of any treated water to local watercourses;
- The application of environmental protection project design measures during drilling activities;
- Effects will be temporary in duration and reversible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: Due to the fact that there are no drilling works required for any of the Other Elements within the Mulkear River catchment, and no Other Element occurs within the Newport[Tipperary]_SC_010 sub catchment, and the fact that the Other Elements are mainly located in the River Suir catchment, it is considered that there is no potential for in-combination effects with the Other Elements of the Whole UWF Project.

Significance of the Cumulative Impact: No cumulative impact

Rationale for Cumulative Impact Evaluation:

- No Other Elements require directional drilling works or instream works in the Mulkear River catchment.

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

Element 2: UWF Related Works

Impact Magnitude: None

Significance of the Impact: No impact

Rationale for Impact Evaluation:

- No instream works or drilling works within the Mulkear River catchment.

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

Element 4: Upperchurch Windfarm

Impact Magnitude: None

Significance of the Impact: No impact

Rationale for Impact Evaluation:

- No instream works or drilling works within the Mulkear River catchment.

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Newport Town Park, Castlewaller Windfarm and potential Bunkimalta Windfarm
- Please refer to Section 11.5.4.7 for cumulative information

Evaluation of Cumulative Impacts – Surface water quality impacts during directional drilling works

All Elements of the Whole UWF Project

Cumulative Impact Magnitude: 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, and

none of the Other Elements are located in the Newport[Tipperary]_SC_010 sub catchment, where drilling for UWF Grid Connection will take place.
Significance of the Cumulative Impact: No Cumulative Impact
Rationale for Cumulative Impact Evaluation: • There will be no requirement to undertaken drilling for any other element of the Whole UWF Project, and none of the Other Elements are located within the Mulkear River catchment
All Elements of the Whole UWF Project with Other Projects or Activities - *Please refer to Section 11.5.4.7 for cumulative evaluation*

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Fuel, oils and chemicals
Cumulative Impact Source: Fuel, oils and chemicals
Impact Pathway: Runoff and surface water flowpaths

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

Impact Quality: Negative

Evaluation of the Impact of the Subject Development – Water quality impacts from fuels, oils and chemicals

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

Plant and equipment will be used at all UWF Grid Connection construction works areas, including 6 locations within the boundary of the Lower River Shannon SAC. 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 Imperceptible (see Section 11.2.4.5) and the fact that the majority of the UWF Grid Connection construction works areas are upstream of the SAC, 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 11.2.4.5);
- Refueling or overnight parking will not be permitted within 100m of the boundary of the SAC (Project Design Measure);
- Any spills along the 110kV UGC are likely to be small isolated incidents and comprise very small amounts, and the actual residual volumes that might reach the downstream Lower River Shannon SAC are likely to be negligible if any.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects in the UWF Grid Connection Cumulative Study Area (regional Mulkear River catchment) relates to the Bilboa_SC_010 sub-catchment, where UWF Grid Connection, Upperchurch Windfarm and UWF Related Works construction works will also take place. Contamination effects from oil/fuel leakages from construction machinery or from storage areas are unlikely to occur but there is potential for isolated incidents.

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

Significance of the Cumulative Impact: Imperceptible.

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Rationale for Cumulative Impact Evaluation:

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

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

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

Element 2: UWF Related Works

Impact Magnitude:
Only 1.7km of the Internal Windfarm Cabling is located within the Mulkear River catchment and effects on the downstream SAC are unlikely due to the small volumes that will be present on-site at any one time, and the transient nature of the works.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- The volumes on-site will be very small, and therefore no effects are expected.

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology Chapter, see Reference Documents Volume F8) the potential for water quality effects arises from the use and storage of oil and fuels and surface waters downslope of the site can be affected. The effects were considered to be Not Significant for tributaries of the River Shannon.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

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

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

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

Whole UWF Project Effect

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

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Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • The use of fuels, oils and chemicals within the Mulkear River 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 Mulkear River catchment in relation to the UWF Related Works and Upperchurch Windfarm will also be very small; and, • Any spills and leaks that do occur (if any) are likely to be small isolated incidents and therefore the potential for cumulative effects on the Lower River Shannon SAC is negligible.

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

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Cement based compounds
Cumulative Impact Source: Cement based compounds
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the protected species and habitats within the SAC.

Impact Quality: Negative

Evaluation of the Impact of the Subject Development – Water quality impacts from cement-based compounds

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Given that the worst-case effects on local surface water bodies has been assessed to be Imperceptible (see Section 11.2.4.6) and the fact that the majority of the UWF Grid Connection construction works area are upstream of the SAC (with the exception of c. 1090m of the 110kV UGC which overlaps the SAC boundary at the Rockvale Bridge and Anglesey Bridge crossing and 4 no. short stretches along the public roads, but no in-stream works or joint bays are proposed within the SAC boundary), and the lining of the sections of trenches that overlap the SAC with an impermeable geotextile to prevent any potential migration of cement from the trench base/sides, 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 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 11.2.4.6);
- The volume of cement that will be used within the SAC boundary will be small (c.250m^3), and in the context of the location of the trench in the public road pavement;
- 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 sections of trenches that overlap the SAC along the R503 will be lined with an impermeable geotextile to prevent potential migration of cement from the trench base/sides (Project Design Measure);
- Concrete chute washouts within the SAC boundary will take place into designated bins for removal to the designated concrete wash settlement pond at the Mountphilips Substation site;
- No in-streams works are proposed at any watercourse crossing points (including the Newport River and Bilboa River crossings) within the boundary of the Lower River Shannon SAC and therefore there will be no placement of cement or other materials within the river channels or on the river banks within the SAC.
- All 110kV UGC works within the boundary of the Lower River Shannon SAC will only be completed during dry weather in the dryer months of the year – i.e. February to September included.
- A member of CIEEM and the Institute of Fisheries Management will be present for all concrete pours within the SAC overlapping Sections (Project Design Measure);
- The Mountphilips Substation is set back more than 25m from local watercourses, and 6km from the downstream SAC and therefore no impacts on water quality from cement based compounds is anticipated.

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Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects is limited to the Bilboa_SC_010 sub-catchment in which cement is being used for each Element. Concrete will be used for the UWF Grid Connection 110kV UGC trench and also for 2 no. Consented UWF Turbines within the Bilboa_SC_010 sub-catchment. Given the relatively small volumes of concrete which will be present on-site at the UWF Gird Connection trench at any one time, the in-combination magnitude of effect is considered to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC:
- The relatively small volumes of cement on-site at the UWF Grid Connection trench at any one time with the potential to cause surface water quality impacts will be small;
- Application of project design measures for UWF Grid Connection;
- 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 Grid Connection are expected.

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

Element 2: UWF Related Works

Impact Magnitude:
The use of cement-based compounds will be limited to the Telecom Relay Pole foundation (c.4m^3) and 9 no. road crossings, all of which are within the River Suir catchment area. Therefore, there is no potential for impacts to the Lower River Shannon SAC.

Significance of the Impact: No Impact

Rationale for Impact Evaluation: No cement based compounds will be required for UWF Related Works where it overlaps the catchment area of the Lower River Shannon SAC.

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) of the 2013 EIS, there is a risk of spillage and runoff from cement during placing of concrete and also during washing out of chutes. The use of cement will mainly be used for turbine base construction. In addition, only 2 no. turbines of the 22 no. permitted are located within the River Shannon catchment. The effects on tributaries within the River Shannon were assessed to be Not Significant.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

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

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

Evaluation of Other Cumulative Impacts – Water quality impacts from cement-based compounds
Whole UWF Project Effect
Cumulative Impact Magnitude: Cumulative effects from cement-based compounds for the Whole UWF Project within the Mulkear River catchment area relates to concrete used in 2 no. Consented UWF Turbine foundations along with concrete used for the UWF Grid Connection 110kV UGC and for foundations at Mountphilips Substation. Given that the majority of the UWF Grid Connection is located within the Mulkear River catchment and the majority of the Upperchurch Windfarm is located within the River Suir catchment, the in-combination magnitude of effect will be as per the UWF Grid Connection which is **Negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • The use of cement-based compounds within the Mulkear River catchment will comprises minor volumes over a large geographical area within several local surface water bodies; • The volumes of cement-based compounds present within the River Shannon catchment in relation to the Upperchurch Windfarm will also be small (only 2 No. Consented UWF Turbines will be constructed within the catchment area of the Lower River Shannon SAC); and, • Any spills that do occur are likely to be small isolated incidents and therefore the potential for cumulative effects is negligible.

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

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

Cumulative Impact Description	
Project Stage	Construction Stage

Source: Earthworks, Dewatering, Watercourse Crossing Works including directional drilling works, Storage of Overburden

Cumulative Source: Forestry felling, Earthworks, storage of overburden, Dewatering and Watercourse Crossing Works

Cumulative Impact Description:
Indirect surface water quality impacts as a result of watercourse crossings, earthworks, groundworks and storage of overburden within the Mulkear River catchment is associated mainly with the UWF Grid Connection element of the Whole UWF Project, sources of impacts could also be associated with construction works for the consented Newport Town Park, Castlewaller Windfarm and the potential Bunkimalta Windfarm, should these projects be constructed during the same period as UWF Grid Connection.

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

UWF Grid Connection Impact Magnitude:
Mountphilips Substation and 29km (of 30.5km) of the 110kV UGC are located within the Mulkear River catchment, with the majority of works upstream of the Lower River Shannon SAC
Due to the large geographical spread and transient nature of the works within the Mulkear River catchment the fact that the majority of the grid route is along public roads, the localized nature of the Mountphilips Substation works and the Project Design Measures which will protect water quality in the SAC, the magnitude of impact is likely to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, negligible magnitude combined with the Extremely High Importance of the SAC;
- The working footprint is spread out over a large geographical area (29km) within the Mulkear River catchment; The majority (74%) of the watercourses along the 110kV UGC are drains or marginal headwater watercourses with low flows, and therefore the effectiveness of them acting as a surface water flowpaths to the down-stream Lower River Shannon SAC is limited;
- The relatively small footprint and localized nature of the Mountphilips Substation;
- The transient nature of the works within local surface water bodies upstream of the SAC;
- The potential for effects is considerably reduced by the carrying out of trenching works and construction of joint bay chambers during the spring/summer months (when ground conditions are typically dryer) along the sections of the 110kV UGC route along the public road where there are numerous smaller watercourses being crossed that drain directly into the main watercourses. Particular areas to note include Clare River (W13 – W20) and W32 and W34 and works within the boundary of the SAC (Project Design Measure);
- As summarised in Section 11.2.4.10, impacts on local surface water bodies are only expected to be Imperceptible, 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 Mulkear River 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

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on the SAC are likely to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Imperceptible magnitude combined with the Extremely High Importance of the SAC;
- The small footprint area of the works within the Mulkear River 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 Mulkear River catchment are more than 50m from a watercourse (there is only 1 no. watercourse crossing in the Mulkear River catchment); and,
- The effects are likely to be brief to temporary in duration and reversible in nature.

Element 4: Upperchurch Windfarm

UWF Impact Magnitude:
Based on Chapter 15 (Hydrology Chapter, see Reference Documents Volume F8) and the Sediment and Erosion and Control Plan from the 2013 EIS, release of sediment during the construction phase is likely to have a negative effect on the River Shannon and its tributaries..

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Firstly, only 2 no. of the 22 no. consented UWF turbines are located within the Mulkear River catchment;
- A process of mitigation by design was adopted by the Consented Upperchurch 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.

Other Project: Newport Town Park

Impact Magnitude: The footprint of the consented Newport Town Park is entirely located within the Mulkear River catchment, downstream of the UWF Grid Connection (110KV UGC route), and located immediately adjacent to the Newport River and overlaps the Lower River Shannon SAC.

Significance of the Impact: Will not be Significant, as reported in the NIS (2018) for the project

Rationale for Impact Evaluation:

- No groundworks within 5m of the river;
- A Sediment Control Plan will be put in place during the construction phase to control runoff from the site.

Other Project: Castlewaller Windfarm

Impact Magnitude: The footprint of the consented windfarm is entirely located within the Mulkear River catchment, up-stream of the UWF Grid Connection (110KV UGC route). The potential Castlewaller Windfarm grid connection (not currently consented or proposed) is assumed to be located within the catchment (where it is likely to be located predominantly on public roads)

Significance of the Impact: Will not be Significant for the windfarm, as reported in the Castlewaller Windfarm EIS (2011), not significant for the grid connection.

Rationale for Impact Evaluation:

- A Sediment Control Plan will be put in place during the windfarm construction phase to control runoff from the site.
- Although the route of the grid connection is currently not know, it is assumed that the majority of the grid connection within the Castlewaller Windfarm site will be along windfarm roads and along public roads outside of the site.

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Other Project: Bunkimalta Windfarm	
Impact Magnitude: The Bunkimalta Windfarm grid connection is also located in the regional Mulkear catchment. It is assumed for the purpose of this cumulative evaluation that at least some of the potential Bunkimalta Windfarm turbines will be located within the Kileengariff_SC_010 and Newport[Tipperary]_SC_010 sub-catchments upstream of the 110KV route. Temporary effects are likely at the downstream SAC. The consented grid connection is partially located within the Mulkear River catchment.	
Significance of the Impact: Will not be Significant (will not be consented unless it can be proven that there will be no significant impacts to European Sites)	
Rationale for Impact Evaluation: • The design of the windfarm is likely to follow best practice with construction activities located at least a minimum of 50m from watercourses where possible; and, • It is assumed that a Sediment and Erosion Control Plan will be put in place during the construction phase to control runoff from the site.	
Evaluation of Other Cumulative Impacts – Surface Water Quality Effects from Suspended Sediments	
Cumulative Impact Magnitude: The cumulative magnitude of surface water quality effects due to suspended solids from construction works associated with the Whole UWF Project (UWF Grid Connection, UWF Related Works and Upperchurch Windfarm) and from Newport Town Park, Castlewaller Windfarm and Bunkimalta Windfarm (should these projects be constructed during the same period) is considered to be **Negligible**	
Significance of the Cumulative Impact: Imperceptible	
Rationale for Cumulative Impact Evaluation: • The transient nature of the 110kV UGC works upstream of the SAC; • The small scale of the UWF Related Works and the Upperchurch Windfarm within the River Shannon catchment; • The Sediment Control Plans that are proposed for the Bunkimalta Windfarm which will prevent significant surface water quality impacts; • The large area of the Mulkear River catchment (~735km^2) catchment and the inherent high assimilative capacity of the Lower Shannon & Mulkear Hydrometric area; and, • The grid connections for both Castlewaller Windfarm and Bunkimalta Windfarm (should they be built) is expected to be predominantly along public roads and therefore impacts on surface water quality are not expected.	

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11.5.4.8 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 11-43 below.

Table 11-42: Description and Rationale for Excluded Impacts to Lower River Shannon SAC

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

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Surface water quality impacts due to tree felling	1,2,4	SW Runoff	Surface Water Quality Impacts due to felling activities	Rationale for Excluding: Neutral effect. No forestry felling required for UWF Grid Connection. No felling required for UWF Related Works or Upperchurch Windfarm within the Mulkear River catchment
Operational Stage				
Runoff form Permanent hardstanding and flood risk from permanent watercourse crossing culverts	1, 2, 4	SW Flowpaths	Increased flood risk	Rationale for Excluding: Neutral effect. There are no new watercourse crossing structures within the Lower River Shannon SAC. All new 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 being assessed to be imperceptible because any new or replaced culverts will be sized to cope with a 100-year flood flow as per the Project Design Measure (see Section 11.2.4.9) 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.
Surface water quality impacts from runoff from permanent hardstanding surfaces	1,2, 4	SW Flowpaths	Surface Water Quality Impacts due to suspended solid input from permanent hardstanding surfaces	Rationale for Excluding: Neutral effect. 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.

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

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11.5.5 Mitigation Measures for Impacts to Lower River Shannon SAC

Mitigation measures were incorporated into the UWF Grid Connection project design, including the Project Design Measures. No additional mitigation measures are required as the topic authors conclude that **significant impacts are not likely to occur to Lower River Shannon SAC** as a consequence of the UWF Grid Connection.

11.5.6 Evaluation of Residual Impacts to Lower River Shannon SAC

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Lower River Shannon SAC above (Section 11.5.4) – i.e. **imperceptible**.

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

The UWF Grid Connection Environmental Management Plan also includes Best Practice Measures (BPM), which although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

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

GC-BPM-01	Measures for Protection of Surface Water Quality and Watercourse Morphology during instream works at Mountphilips Substation site
GC-BPM-02	Measures for Protection of Surface Water Quality and Watercourse Morphology during replacement of existing culverts along the 110kV UGC outside Mountphilips Substation site
GC-BPM-03	Design of New Permanent Watercourse Crossing Structures and Existing Culvert Replacements to Prevent Flood Risk
GC-BPM-04	Surface Water Quality Protection Measures for Site Runoff During the Mountphilips Substation Site Construction Works
GC-BPM-05	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-06	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-07	Surface Water Quality Protection Measures During Storage of Overburden at the Mountphilips Substation Site

These Best Practice Measure form part of the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

11.5.7.1 Surface Water Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Surface Water Management Plan. Water quality and the existing drainage regime will be managed under the Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection. This Surface Water Management Plan (SWMP) provides the water management framework for the appointed Contractors and Sub-contractors and it incorporates the mitigating principles described in this EIAR (particularly in Chapter 11 – Water) to ensure that construction works are carried out with minimal impact on the surface water environment and in accordance with the mitigation measures and project design commitments made in the EIAR. The Surface Water Management Plan is part of the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

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11.5.8 Summary of Impacts to the Lower River Shannon SAC

A summary of the Impacts to the Lower River Shannon SAC is presented in Table 11-44.

Table 11-43: Summary of the impacts to the Lower River Shannon SAC

	Surface water quality impacts				Water quality impacts from	
Impact to the Lower River Shannon SAC:	**due to earthworks**	**from dewatering of excavations**	**from watercourse crossing works**	**during directional drilling works**	**fuels, oils and chemicals**	**from cement-based compounds**
Evaluation Impact Table	*Section 11.5.4.1*	*Section 11.5.4.2*	*Section 11.5.4.3*	*Section 11.5.4.4*	*Section 11.5.4.5*	*Section 11.5.4.6*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction	Construction
UWF Grid Connection (direct)	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**
UWF Grid Connection (cumulative)	**Imperceptible**	**Imperceptible**	**No Cumulative**	**No Cumulative**	**Imperceptible**	**Imperceptible**
Element 2: UWF Related Works	Imperceptible	No Likely Impact	No Impact	No Impact	No Impact	No Impact
Element 3: UWF Replacement Forestry	No Potential for Impacts - Evaluated as Excluded, see Section 11.5.2.2.1					
Element 4: Upperchurch Windfarm	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					
Cumulative Impact:						
Whole UWF Project Effect	**Imperceptible**	**Imperceptible**	**Imperceptible**	**No Cumulative Impact**	**Imperceptible**	**Imperceptible**
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Bunkimalta Windfarm Castlewaller Windfarm Newport Town Park	Imperceptible– *See Section 11.5.4.7*				N/A - evaluated as excluded, see Section 11.5.2.2.1	

The greyed out boxes in the 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.

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 Grid Connection is described in Table 11-46 and illustrated on Figure GC 11.6: UWF Grid Connection Study Area for Lower River Suir SAC (Volume C3 EIAR Figures).

Table 11-44: UWF Grid Connection Study Area for Lower River Suir SAC

Study Area for Lower River Suir SAC	Justification for the Study Area Extents
Suir_SC_030 sub-catchment within the Regional River Suir Hydrometric are HA16	Defined by local topography and regional drainage

11.6.1.2 Baseline Context and Character of Lower River Suir SAC in the UWF Grid Connection Study Area

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

Within the River Suir catchment, the last c.1.5km of the UWF Grid Connection 110kV UGC route is located in the Clodiagh (Tipperary)_010 local surface water body (sub-basin) which exists within the Suir_SC_030 sub-catchment. The UWF Grid Connection construction works are located c.12km upstream of the River Suir SAC.

Within the Suir_SC_030 sub-catchment of the River Suir, there are a total of 5 no. watercourses within the construction works area boundary associated with the UWF Grid Connection (W64 – W68). The 110kV UGC will cross all 5 watercourses at existing crossing points (culverts) along the public road network – 3 no. (W64, W65, W66) are located L2264-50 and L6188-0 public roads, while the remaining 2 no. (W67 and W68) are located along the private paved road to the Consented UWF Substation. Due to the primarily upland nature of the study area, all of the watercourses intercepted by the UWF Grid Connection within the River Suir catchment are either drains or minor headwater (1st - 2nd order) streams.

Existing Water Quality Monitoring Data and WFD Waterbody Status

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. Q-Values are available for the Clodiagh River downstream of the works area. The Q-Value for the Clodiagh River within the Clodiagh (Tipperary)_010 local surface water body is Good to High. The EPA and Water Framework Directive "Status"

[4]It should be noted that **there are two Clodiagh Rivers within the catchment of the Lower River Suir SAC**; the Clodiagh River which rises in the eastern extent of the UWF Grid Connection 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.

and "Risk Result" for surface water bodies in the area of the UWF Grid Connection are shown in Table 11.10 and Table 11-11. The status of the Clodiagh (Tipperary)_010 is reported to be At Risk of morphological and forestry related effects such as suspended sediment and eutrophication.

Classification of Watercourses at Crossing Locations

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. All of the watercourse crossings in the Clodiagh (Tipperary)_010 of the River Suir are existing culverts. Based on the field surveys, the watercourses are categorised Class 2 (fisheries value) and Class 4 (drains, no fisheries value). Within the River Suir catchment, 4 no. of the 5 watercourses are classed as Class 4 – Drain and considered to have no fisheries value. The remaining watercourse at crossing point W65 is a Class 2 watercourse (stream) which does have fisheries value.

Watercourse crossing works

No works are required to 4 of the 5 existing culverts, with the 110kV UGC installed either under or over the culverts. The remaining culvert relates the existing culvert at W63 (Class 4 drain) which potentially may need to be replaced during construction works.

Flood Risk: 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. In summary, the area of the UWF Grid Connection within the River Suir catchment is considered to have low risk of flooding, due to the elevated nature of the construction works areas, and due to the location of the majority of the works areas outside of any mapped fluvial or pluvial flood extent zones, being located in fluvial Flood Zone C (Low Risk).

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 **Extremely High** importance.

11.6.1.4 Sensitivity of Lower River Suir SAC

One of the primary sensitivities of the SAC is surface water quality. As stated above, the majority of the watercourses (4 out of 5) at the works areas are drains with no fisheries value, and there are typically, themselves, not sensitive to impact but are potential pathways.

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

Based on the EPA database, exception of the Clodiagh (Tipperary)_010, based on the WFD surface waterbody reports (www.wfdireland.ie), the surface water bodies wthin the Lower River Suir catchment in the study area are reported to be **Not at Risk** from water quality impacts (diffuse and point source) or morphological impacts. The Clodiagh (Tipperary)_010 catchment is **At Risk** from morphological impacts (channelization) and forestry related impacts, and it is therefore considered that there are potential negative rising trends relating to water quality or morphology.

11.6.1.6 Receiving Environment (the Baseline + Trends)

Due to the slow rate of change, it is expected that the status of waterbodies will be the same at the time of construction (2020/2021). However, 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.

11.6.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.6.2.1 Cumulative Evaluation Study Areas

11.6.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

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

UWF Grid Connection Cumulative Evaluation Study Area for Lower River Suir SAC	Justification for the Study Area Extents
Suir_SC_030 sub-catchment within the Regional River Suir Hydrometric are HA16	Suir_SC_030 sub-catchment is one of the main catchments in which the UWF Grid Connection is located. Suir_SC_030 sub-catchment drains to the Lower River Suir SAC.

The study is illustrated on Figure CE 11.6: UWF Grid Connection Cumulative Evaluation Study Area for Lower River Suir SAC.

11.6.2.1.2 Whole Project Cumulative Evaluation Study Area

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

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

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 11.6.2.2.1 below.

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 11-47 and illustrated on Whole Project Study Area for Lower River Suir SAC.

Table 11-45: Whole Project Cumulative Evaluation Study Area for Lower River Suir SAC

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Suir_SC_030 sub-catchment and Multeen (East) SC_010 within the Regional River Suir Hydrometric area HA16 *(the UWF Related Works and Upperchurch Windfarm are also located in the Multeen (East) SC_010).*	The Whole UWF Project elements are located in the Suir_SC_030 and Multeen (East) SC_010. Both catchments drain to the Lower River Suir SAC. Extending the scoping area beyond the Suir_SC_030 and Multeen (East) SC_010 would mean that a much larger proportion of the River Suir catchment would be included and therefore at this scale, the Whole UWF Project would likely have a Neutral effect in relation to cumulative impacts.
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

11.6.2.2 Scoping for Other Projects or Activities & Potential for Impacts

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 Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.22).

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

11.6.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Lower River Suir SAC

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Lower River Suir SAC. The results of this evaluation are included in Table 11-48.

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

Table 11-46: 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 3: UWF Replacement Forestry	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral effect/No potential for effects due to: • The Haul Route Activities are located entirely within the public road corridor. There will be no requirement for earthworks/groundworks and therefore no hydrological / water quality effects are likely. • Overhead Line Activities: These works involve upgrade works to the overhead existing lines such as cable wrapping which do not require any major excavations. Therefore no surface water or groundwater impacts are expected. • Monitoring Activities do not require any major construction activities. Therefore, no surface water or groundwater impacts are expected. Once off activities will take place during the pre-construction stage, and comprise planting and fencing at hedgerows, watercourse boundaries and areas of scrub. These activities will generally take place on the periphery of fields and are not expected to impact on water quality. • During the Operational Stage, farming practices under the Upperchurch Hen Harrier Scheme will, to a certain extent, cause lands to revert back to wet grassland. All associated potential hydrological effects are expected to be Neutral. During decommissioning of UWF, the Upperchurch Hen Harrier Scheme will finish, but no activities will be required, therefore no water quality effects are expected.

11.6.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.6.2.3.1 Element 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 Suir_SC_030 sub-catchment of the Clodiagh River catchment. Some of the works also extend into the Multeen (East) SC_010 sub-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 these 31. no watercourses, 25 no. will require instream works for UWF Related Works.

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.

11.6.2.3.2 Element 3: UWF Replacement Forestry

The entire UWF Replacement Forestry site is located within the River Suir catchment, in the Suir_SC_030 sub-catchment of the Clodiagh River catchment. The UWF Replacement Forestry is located at least 12km upstream of the SAC.

11.6.2.3.3 Element 4: Upperchurch Windfarm

The majority of the Upperchurch Windfarm construction works areas are located within the River Suir catchment. The majority of the construction works areas within the River Suir catchment are located locally within the Suir_SC_030 sub-catchment with some also in the Multeen (East) SC_010 sub-catchment. There is only one crossing of a natural stream associated with the Upperchurch Windfarm, a new crossing structure, comprising a clear span bridge, will be constructed at this crossing point, which is at least 12km upstream (Suir_SC_030 sub-catchment) of the Lower River Suir SAC.

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

11.6.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 11.6.2.2.1

11.6.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.6.2.2

11.6.3 PROJECT DESIGN MEASURES for Lower River Suir SAC

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

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

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

There are no Project Design Measures developed specifically for the Lower River Suir SAC. **The Project Design Measures developed for Local Surface Water Bodies in Section 11.2.3 are also relevant to the River Suir SAC.** These project design measures are presented again below.

Please Note: The Project Design Measures will be implemented through the Environmental Management Plan for UWF Grid Connection, which includes a Surface Water Management Plan (See Volume D appended to this EIA Report)

Table 11-47: UWF Grid Connection Project Design Measures relevant to the Lower River Suir SAC

PD ID	Project Design Environmental Protection Measure (PD)
PD17	At Mountphilips Substation, water for operational stage welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site.
PD18	The new substation compound and the new permanent access road at the Mountphilips Substation site will have a permanent surface water drainage network in place which will include check dams. These check dams will allow the settlement of suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD19	At Mountphilips Substation location, where dewatering of trenches or excavations is required, there will be no direct discharge of untreated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate to the volume of water requiring treatment (if any) to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD20	At Mountphilips Substation site, all excavated material will be removed for temporary or permanent storage at designated berms, which will be located more than 25m away from the watercourses on Mountphilips Substation site. All storage berms will be graded and sealed following emplacement. The berms will be covered if there is a risk of erosion. Temporary silt control methods such as silt fencing will be placed around all overburden storage areas. The existing vegetative buffer between the berms and the nearest watercourses will be maintained and no works will occur in the buffer zone.
PD21	At Mountphilips Substation site, the permanent storage berms will be along the new access road and around the substation compound will be planted with local provenance native fruiting hedge species, with grasses and native flower species common to the surrounding vegetation sown along the sides of the berms. Local provenance native wildflower seed of flowering plants like clovers, vetches and knapweed will be included. Revegetation works will take place at the

	soonest practicable opportunity after emplacement.
PD22	Outside of the Mountphilips Substation site, there will be no storage of overburden and all excavations from road trenches will be removed to licensed waste facilities in accordance with the UWF Grid Connection Waste Management Plan. Loads of excavated material will be covered during transportation to prevent spillages of excavated material.
PD23	All Joint Bays for the 110kV UGC will be located at least 50m from a Class 1 or Class 2 watercourse and at least 25m from Class 3 or Class 4 watercourses.
PD24	Outside of the Mountphilips Substation site, where dewatering of trenches or excavations is required for the 110kV UGC, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD25	Construction works along the 110kV UGC route will cease during heavy or prolonged rainfall events, and any open trenches or excavations will be covered. Use of weathering forecasting will be undertaken in advance of works.
PD26	A phased approach will be undertaken in relation to excavations, excavation dewatering and any culvert replacement works, where these works occur within 50m of a watercourse. The phased approach will only permit one of main potential sediment producing activities (i.e. excavations, excavation dewatering or culvert replacement works), to be carried out within 50m of a watercourse, at any one time.
PD27	At Mountphilips Substation site, works within 50m of watercourses, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD28	Along the 110kV UGC on the public road, where works will take place within 50m of a watercourse, additional mitigation measures will be implemented which include silt fencing and placement of sandbag arrangements along preferential surface water flowpaths on the road pavement. Following works on any particular section, any works debris will be removed from the road before the sandbags and silt fences are removed.
PD29	Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included. This will minimise/avoid the requirement for any excavation dewatering as a result of waterlogged soils or surface water runoff. None of these 110kV UGC sections are within the Lower River Shannon SAC.
PD30	Lines of silt fencing and sandbags will be erected along the edge of the road so that surface water runoff from adjacent construction works areas is captured and directed to the excavated trench, where it can be pumped and treated before being released, as per PD24.
PD31	Works to bridge parapet walls at watercourse crossings W7, W36, W53 will be carried out during dry weather, and debris netting will be fixed to the outside of the walls in order to prevent any debris falling into the watercourse below.
PD32	At Mountphilips Substation site, instream construction works at the watercourse crossings W1, W2 and W3 will be followed by site-specific reinstatement measures to ensure the equilibrated restoration of flow character and morphology within the affected reach to achieve baseline character and avoid any deterioration in morphology as required under the Water Framework Directive (WFD). Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margins to stabilise banks, add flood protection and provide riparian buffer; and the use of deflector plates during the restoration of flow. Instream works at W1, W2 and W3 at the Mountphilips Substation site will be undertaken during dry weather within the IFI instream works window (July – September inclusive). As per PD41, instream works at W1, W2 and W3 will be supervised by a member of

	CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice are followed. Although intended for the purpose of the WFD, this measure will also indirectly contribute to downstream water quality protection in the SAC.
PD33	All new permanent watercourse culverts at the Mountphilips Substation site and any replacement culverts along the public road for the 110kV UGC will be sized to cope with a minimum 100-year flood event.
PD34	Only precast concrete culverts or structures will be used at the watercourse crossing locations at Mountphilips Substation site and for any culvert replacements along the 110kV UGC. Only precast concrete chambers will be used at Joint Bay locations. No batching of wet cement will take place on-site.
PD35	Concrete pours will be required for the 110kV UGC cables trench. Only chutes will be washed out at the works locations into the cable trench, with the washout of the tank taking place at the concrete supplier depot. Concrete chute washouts within the SAC boundary will take place into designated bins for removal to the designated concrete wash settlement pond at the Mountphilips Substation site.
PD36	The sections of 110kV UGC trenches that overlap the Lower River Shannon SAC will be lined with an impermeable geotextile material to prevent potential migration of cement from the trench base or sides into the SAC.
PD37	In addition to PD22, there will be no storage of overburden within the Lower River Shannon SAC.
PD38	110kV UGC works outside of Mountphilips Substation site will be carried out entirely on paved roads and where the 110kV UGC crosses watercourses, the works will be carried out over the existing bridges and over/under existing culverts. No in-streams works are proposed at any watercourse crossing points (including the Newport River and Bilboa River crossings) within the boundary of the Lower River Shannon SAC and therefore there will be no placement of cement or other materials within the river channels or on the river banks within the SAC.
PD39	In addition to PD42, there will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within 100m of the boundary of the Lower River Shannon SAC.
PD40	In addition to PD29, all 110kV UGC works within the boundary of the Lower River Shannon SAC will only be completed during dry weather in the dryer months of the year – i.e. February to September included.
PD41	The instream works at W1, W2 and W3 at Mountphilips Substation site, and the culvert replacement works at the 13 existing culverts on the public road, and all works (including concrete placement) within the boundary of the Lower River Shannon SAC, will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice Measures are followed.
PD42	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD43	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound at the Mountphilips Substation site. All fuel will be stored in bunded, locked storage containers. The designated storage location will be greater than 100m from a watercourse. Spill response apparatus including spill-kits and hydrocarbon absorbent packs will be stored at the designated location in the temporary compound and all operators will be fully trained in the use of this equipment. The Environmental Emergency Response Procedure will be implemented immediately in the event of any spills. The Environmental Emergency Response Procedure is part of the UWF Grid Connection Environmental Management Plan.
PD44	Overnight parking of plant and machinery will only be permitted at the temporary compound at the Mountphilips Substation site and at a distance greater than 50m from watercourses.
PD45	The horizontal directional drilling works at W8 and W9 will be carried out by an experienced Drilling Contractor and supervised and managed by a competent and experienced Mud Engineer

	who understands the technicalities and challenges of drilling works. The Mud Engineer will advise the Construction Manager on the selection of competent drillers for the HDD works; monitor the watercourse bed during drilling works, and will supervise the drilling works including the drilling pressures and the implementation of any contingency measures. From a surface water quality protection perspective, the area around the launch/reception pit, bentonite batching, pumping and recycling plant will be bunded using appropriate terram geotextile and/or sandbags in order to contain any spillages. Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized water tight skip before being taken off-site to a suitably licensed waste facility. In the event of a break-out occurring, the Environmental Emergency Response Procedure for Frac-Out will be implemented which includes the following contingency measures; In the event of break-out occurring in the river bed, the rig will immediately shut off the pumps and the drilling assembly will be pulled off to reduce annular pressures; In the event of break-out on the road an excavator will be available to dig a pit to contain fluid with vacuum trucks/pumps available to transfer drill fluid from the containment point back to the recycling point; and in either scenario, drilling fluid additives designed to plug the formation will be introduced to the circulation system and let set. Environmental Emergency Response Procedures are included in the UWF Grid Connection Environmental Management Plan (see Volume D).
PD46	All construction works will be monitored on a daily basis by the Environmental Clerk of Works and by members of the Environmental Clerk of Works team (for example Site Ecologist) as required, for compliance with the Environmental Commitments, which include the Project Design Measures, as per the UWF Grid Connection Environmental Management Plan (see Volume D).
PD47	Surface water quality monitoring of the main watercourses downstream of the works will be carried out to ensure that the downstream water quality status in the receiving water is maintained and that there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009. Where non-compliance in water quality is measured or recorded, works will stop until the issue is resolved. The surface water monitoring locations and sampling programme are defined in the Surface Water Management Plan for UWF Grid Connection. The Surface Water Management Plan is part of the UWF Grid Connection Environmental Management Plan (see Volume D).
PD48	The new permanent cross structures at the Mountphilips Substation site and the replacement culvert at W14 along the R503 will be bottomless or clear spanning.
PD49	In-stream works at Mountphilips Substation site and culvert replacement works at W14 along the R503 Regional Road will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
PD50	Culvert replacement works along the 110kV UGC will not be undertaken without isolation of flow within the watercourse. Isolation of flow will be achieved through the use of sandbags filled with clean, washed sand. Any fish within the isolated section will be removed prior to works commencing. This will require the engagement of licensed fisheries personnel to deplete the works area using electrofishing and, following collection of biometrics, transferred immediately downstream of the crossing point and placed back in the water. The water will then be isolated from the works by over pumping using a flume (pipe), with deflector plates used on the downstream side of the flume to reduce the hydraulic power of the water. Construction works at the crossing will be followed by site-specific reinstatement measures to ensure the equilibrated restoration of flow character and morphology within the affected reach to achieve baseline character and avoid any deterioration in morphology as required under the Water Framework Directive (WFD). Measures will include: bank stabilization measures, reinstatement of bank slope and character; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and the use of deflector plates during the restoration of flow. As per PD41, culvert replacement works will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice are followed. These measures will ensure that the baseline character

	is maintained and will ensure that a deterioration in morphology is avoided, as required under the Water Framework Directive. This in turn will protect Aquatic Ecology.

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works, UWF Replacement Forestry and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3, 5.4 and 5.5in 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 11-48: List of all Impacts included and excluded from the Impact Evaluation Table sections

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

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 11.6.4.1 to 11.6.4.5.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 11.6.4.6.

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Earthworks and groundwork

Cumulative Impact Source: Earthworks and groundwork

Impact Pathway: Runoff and surface water flowpaths

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

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

Only approximately 1.5km (of the total 30.5km), of the UWF Grid Connection, is located within the Suir_SC_030 sub-catchment and is at least 11.5km upstream of the Lower River Suir SAC. UWF Grid Connection works within the Lower River Suir SAC are limited to trenching works, including the construction of c. 2 Joint Bays, within public road pavements. Also, there are no temporary or permanent overburden storage areas required for the UWF Grid Connection within the River Suir catchment, as all excavations from the public road will be removed to licensed waste facilities, and therefore the potential for effects on the SAC is considered to be unlikely.

Significance of the Impact: No likely impacts

Rationale for Impact Evaluation:

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

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: UWF Grid Connection, UWF Related Works, Upperchurch Windfarm and UWF Replacement Forestry works will take place in the Clodiagh River catchment.

The UWF Grid Connection is located within paved road surfaces within the River Suir catchment. In relation to storage of excavated materials (overburden), no storage is associated with UWF Grid Connection in the River Suir catchment as all excavations will be removed to licensed waste facilities (all loads will be covered during transit to prevent escape of material, as per Project Design).

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

Cumulative overburden storage relates to UWF Related Works with Upperchurch Windfarm, where overburden will be permanently stored and will be temporarily stored for later reinstatement in the Suir regional catchment. It is possible that erosion of these storage areas could result in surface water quality impacts locally.

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

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, negligible magnitude combined with the Extremely High Importance of the SAC;
- While the majority of the UWF Related Works, the majority of Upperchurch Windfarm works, and all of the UWF Replacement Forestry, are located within the River Suir catchment, in-combination effects to local surface water bodies will be no greater than Slight (see Section 11.2.4.3) due to: the location of 62% of the Internal Windfarm Cabling within Consented UWF Roads which will reduce excavation requirements;
- the localised nature of effects from Haul Route Works and Realigned Windfarm Roads due to the scale of these works;
- imperceptible effects associated with UWF Replacement Forestry;
- the implementation of the Sediment & Erosion Control Plan for the consented Upperchurch Windfarm;
- low or marginal ecological value of the majority of watercourses.
- Temporary nature of the works

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

Element 2: UWF Related Works

Impact Magnitude:
The majority of the works associated with UWF Related Works are located with the River Suir catchment (Clodiagh and Multeen catchments). Of the total 17.9km of internal windfarm cabling, 16.2km is located within the River Suir catchment.
The potential for water quality effects will arising during earthworks required for the Internal Windfarm Cable trench (16.2km), temporary access roads (5.3km), Haul Route Works (refer to Table 11-14), Realigned Windfarm Roads and the Telecom Relay Pole works.

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

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC;
- The majority of the watercourses intercepted by the works are drains (Class 4 watercourse) with low flows or no flows, and therefore the effectiveness of them acting as a surface water flowpath to the downstream SAC is limited;
- The vast majority of the works area (with the exception of watercourse crossings) are located more than 50m from a watercourse;
- All temporary and permanent overburden storage area will be located more than 50m from a Class 1 and Class 2 Watercourse;
- There is a substantial 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 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

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be negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- The small scale planting and the non-intrusive nature of the works.

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on Chapter 15 (Hydrology Chapter, see Reference Documents Volume F8) and the Sediment and Erosion and Control Plan from the 2013 EIS, release of sediment during the construction phase is likely to have a minor negative effect on the River Suir and its tributaries.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The upland nature of the site (remote from the main local streams and rivers) and the small number of drainage features within the site; and,
- The measures outlined in the EIS and within the Sediment and Erosion and Control Plan will ensure the development of the wind farm will not have a significant impact on the surface water quality in the River and its tributaries.

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

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

Whole UWF Project Effect

Earthworks and storage/movement of excavated material will occur in the Suir_SC_030 sub-catchment and Multeen (East)_SC_10 sub-catchment within the Lower River Suir SAC catchment area.

The cumulative minor water quality effects, which are likely to be brief to temporary, are more likely to occur to the SAC within the Suir_SC_030 sub-catchment, as the majority of the UWF Related Works and the Upperchurch Windfarm are within this catchment.

The UWF Grid Connection is located within paved road surfaces within the River Suir catchment with no storage of overburden in the catchment.

Due to the transient and distributed nature of the construction works associated with both UWF Related Works and Upperchurch Windfarm and that the majority (62%) of the internal windfarm cabling will be located within the Upperchurch Windfarm (and therefore within the capture zone of the windfarm drainage), the impact magnitude on the SAC which is at least 11.5km downstream from works areas, the impact magnitude is considered to be **Negligible**.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC;
- The majority of the 110kV UGC is contained within the River Shannon catchment and therefore its potential to contribute to in-combinations effects on the Lower River Suir SAC is less than negligible; works for UWF Grid Connection are located entirely within paved road surfaces, with no requirement for overburden storage;
- The circa 1.5km of UWF Grid Connection works are located at 12km upstream of the River Sur SAC.
- The majority of the Upperchurch Windfarm and UWF Related Works, including all of the UWF Replacement

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Topic

Forestry, are located within the River Suir. However, as a large proportion (62%) of the Internal Windfarm Cabling is within Consented UWF Roads (i.e. reduced excavation requirements), the negligible effects of the UWF Replacement Forestry and that the effects of the Haul Route works and Realigned Windfarm Roads are likely to be localised, no significant in-combination effects are expected on the River Suir SAC which exists at least 11.5km downstream from Whole UWF Project works; and,

- The Sediment and Erosion Control Plan for the Upperchurch Windfarm has measures in place for controlling runoff during excavation work, and therefore no significant effects are expected on the Lower River Suir SAC;

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir SAC with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.6.2.2).

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

Impact Description	
Project Life Cycle Stage:	Construction stage

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

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

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude: Only Approximately 1.5km of the 110kV UGC is located within the River Suir catchment, where 110kV UGC works will occur across 5 no. Watercourses, all of these watercourses will be crossed at the existing culvert crossing point along the public road network. 1 no. culvert may require replacement during construction works, this watercourse is a drain with no fisheries value. Due to the small scale of works, the downstream distance to the SAC (12km), and crossing structure works limited to 1 out of 5 of the existing crossings, the magnitude of any effects on the downstream SAC will be negligible.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- The small scale of the works
- the downstream distance to the SAC
- the fact that 4 out of the 5 no. watercourses are drains with no fisheries value, and no works required to the watercourse crossing on the Class 2 stream,
- culvert replacement works are for an existing drain culvert under the public road.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to UWF Grid Connection. 1 no. small existing culvert which may require replacement for UWF Grid Connection in the Suir_SC_030 sub-catchment in the Suir catchment, no works are required to the other 4 no. culverts for UWF Grid Connection; additionally within the UWF Grid Connection Cumulative Evaluation Study Area, instream works will occur at 26 no. watercourses within the Suir_SC_030 sub-catchment for UWF Related Works.

There is no potential for Upperchurch Windfarm or UWF Replacement Forestry to cause cumulative effects with UWF Grid Connection as these projects do not require instream works.

No Other Projects or Activities are likely to cause cumulative impacts with UWF Grid Connection to water quality in the downstream Lower River Suir SAC.

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

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- no instream works for Upperchurch Windfarm or UWF Replacement Forestry
- 1 no. culvert which may need replacing for UWF Grid Connection in the Suir_SC_030 sub-catchment.

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

Element 2: UWF Related Works

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- 75% of the in-stream works areas are at drains (Class 4) or marginal watercourses (Class 3) which typically have no flows or very flows and therefore the effectiveness of them acting as a surface water flowpath to the downstream Lower River Suir SAC is limited;
- 31 no. watercourse crossings for UWF Related Works are located in the Suir_SC_030 sub-catchment , with 26 no. at least 11.5km upstream of the SAC and the remaining 5 no. being at least 3km upstream of the SAC;
- Only between 1 and 2 watercourse crossings will be completed in any one day (2 construction crews will be working on Internal Windfarm Cabling works);
- Significant effects are not expected to the local surface water bodies in the area of the works, therefore, significant effects are not expected on the further downstream SAC (refer to Section 11.2.4.4); and,
- The effects will be brief to temporary in nature and reversible.

Element 3: UWF Replacement Forestry

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

Significance of the Impact: No Potential for Impact

Rationale for Impact Evaluation:

- There is no new watercourse crossing works required for the UWF Replacement Forestry.

Element 4: Upperchurch Windfarm

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

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required.

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

Evaluation of Other Cumulative Impacts–Surface water quality impacts from crossing works

Whole UWF Project Effect

Cumulative Impact Magnitude: Effects of the Whole UWF Project mainly relate to UWF Related Works.

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Watercourse crossing works are also required for UWF Grid Connection and Upperchurch Windfarm. Cumulatively these projects will require instream works in the River Suir catchment, where 1 no. existing culverts may potentially need to be replaced during UWF Grid Connection works, instream works will occur at 25 no. separate watercourse crossing points for UWF Related Works, with a new crossing structure over 1 No. natural stream for Upperchurch Windfarm. There is no potential for cumulative effects in relation to this stream crossing at Upperchurch Windfarm, as this will involve the construction of a clear span bridge with no instream works. The Internal Cables for UWF Related Works will be installed in the bridge structure. The magnitude of impacts will be as per the UWF Related Works which is N**egligible**
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • 31 no. watercourse crossings associated with the UWF Related Works in the Suir_SC_030 sub-catchment, 25 no. of which will require instream works; • Only 5 no. of watercourse crossings associated with the UWF Grid Connection (110kV UGC) are located within the Suir_SC_030 sub-catchment, only 1 no. of which (drain) may require culvert replacement; • 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.

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 Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.6.2.2).

Topic: **Water**

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Fuel, oils and chemicals
Cumulative Impact Source: Fuel, oils and chemicals
Impact Pathway: Runoff and surface water flowpaths

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

Impact Quality: Negative

Evaluation of the Subject Development Impact – Water quality impacts from fuels, oils and chemicals

Element 1: UWF Grid Connection– direct/indirect impact

Impact Magnitude:
Only 1.5km of the UWF Grid Connection is located within the River Suir catchment, where 110kV UGC works are located within the public road pavement, and no effects on the downstream SAC are likely due to the small scale, the downstream distance to the SAC (>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:

- 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 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the Suir_SC_030 sub-catchment relates to the use of machinery and vehicles, refueling activities and storage of fuels for UWF Grid Connection, Upperchurch Windfarm, UWF Related Works and UWF Replacement Forestry. Effects from oil and fuel usage are likely to occur rarely and be isolated incidents.

Given the distributed nature of the works within several local sub-catchments, the downstream distance to the River Suir SAC (at least 12km) and the fact that only small volumes of fuel/oil will be present on-site at any one time, the in-combination magnitude of effect is considered to be negligible.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation: As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the local surface water bodies;

- Downstream distance to the River Suir SAC from works within the Suir_SC_030 sub-catchment is at least 12km.
- the distributed nature of the works
- the fact that only small volumes of fuel/oil will be present on-site at any one time;
- The additional volumes of oils and fuels that will be present on site for the UWF Grid Connection and the UWF Related Works will be negligible;
- 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;
- Due to the small scale and nature of the works, UWF Replacement Forestry is not likely to contribute to in-

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combination effects with respect to impacts from oils and fuels; and,
- Effects are likely to be due to small isolated localised spills (worst case) that are very unlikely to contribute to in-combination water quality effects within the local surface water catchments.

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

Element 2: UWF Related Works

Impact Magnitude:
Approximately 16.2km of the total 17.9km Internal Windfarm Cabling is located within the River Suir catchment (Suir_SC_030 and Multeen (East) SC_010 sub-catchments) including all of the Realigned Windfarm Road works and the majority of the Haul Route Works (see Table 11-14).
Any spills or leaks of oils and fuels relating to the works are likely to be minor (worst case), isolated and occur rarely and therefore the magnitude of effects on the SAC are likely to be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- Only relatively small volumes of fuels / oils will be on-site at any one time and therefore no significant effects on local surface water bodies are expected;
- The River Suir SAC is located more than 12km downstream from the majority of the works areas; and,
- Any spills along the along the UWF Related Works areas are likely to be small isolated incidents and comprise very small amounts, and the actual residual volumes that might reach the downstream Lower River Suir SAC are likely to be negligible if any

Element 3: UWF Replacement Forestry

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

Significance of the Impact: No Impact

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Based on the 2013 RFI Chapter 15 (Hydrology Chapter, see Reference Documents Volume F8) the potential for water quality effects arises from the use and storage of oil and fuels. The overall effects were assessed to be not significant.

Significance of the Impact: Not Significant

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

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

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

Topic: **Water**

Whole UWF Project Effect

Cumulative Impact Magnitude:
Machinery run on hydrocarbons, and use of fuels for the Whole UWF Project will be required for all Elements

of the Whole UWF Project, which are all located to some extent within the catchment area of the Lower River Suir, and therefore there is potential for the Whole UWF Project to impact on the Lower River Suir SAC from oil and fuel usage. However, any effects are likely to occur rarely and be isolated incidents, and the magnitude of effects is likely to be **negligible**.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC;
- The location of the majority of the UWF Grid Connection outside of the River Suir catchment, therefore no impacts on the River Suir SAC are expected due to the negligible volumes of fuels and oils associated with UWF Grid Connection that will be present within the catchment.
- 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.

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 Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.6.2.2).

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

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Cement based compounds
Cumulative Impact Source: Cement based compounds
Impact Pathway: Runoff and surface water flowpaths

Impact Description: Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment within the SAC.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Water quality impacts from cement-based compounds

Element 1: UWF Grid Connection- direct/indirect impact

Impact Magnitude:
522m^3 of concrete will be used in the last 1.5km of the 110kV UGC in the Suir_SC_030 sub-catchment.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- Small scale nature of the works and the downstream distance to SAC (<12km)

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: Cement use in the Suir_SC_030 sub-catchment will include concrete in the UWF Grid Connection 110kV UGC, Consented UWF Turbine foundations and Consented UWF Substation and the UWF Related Works (Telecom Relay Pole and at the 9 no. public road crossings of Internal Windfarm Cabling).

Given the relatively small volumes of cement will be present on-site at any one time, the in-combination magnitude of effect is considered to be negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- As per Table 11-7, Negligible magnitude combined with the Extremely High Importance of the SAC;
- The relatively small volumes of cement on-site at any one time with the potential to cause surface water quality impacts will be small;
- The use of concrete for the UWF Grid Connection will be small, 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 Grid Connection are expected.

Topic: Water

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: Limited to the Telecom Relay Pole foundation (c.4m3) and the 9 no. road crossings. Therefore, no impacts on surface water quality or the downstream SAC are anticipated.
Significance of the Impact: No Impact
Rationale for Impact Evaluation: • Small scale nature of the works and the downstream distance to SAC (<12km)
Element 3: UWF Replacement Forestry
Impact Magnitude: None
Significance of the Impact: No Potential for Impact
Rationale for Impact Evaluation: • No requirement to use cement at the UWF Replacement Forestry site
Element 4: Upperchurch Windfarm
Impact Magnitude: Based on Chapter 15 (Hydrology, see Reference Documents Volume F8) of the 2013 EIS, there is a risk of spillage and runoff from cement during placing of concrete and also during washing out of chutes. The use of cement will mainly be for turbine base construction and the substation foundation. 20 no. turbines of the 22 no. permitted are located within the River Suir catchment and upstream of the SAC. However, the effects on the River Suir and its tributaries were assessed to be Not Significant.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • During pouring containment measures will be put in place to keep cement within the foundation area and prevent it entering the local drainage routes; and, • Washing of truck will be limited to the chutes, and a dedicated concrete washout area will be available on-site.
Element 5: UWF Other Activities– *N/A, evaluated as excluded, see Section 11.6.2.2.1*
Evaluation of Other Cumulative Impacts – Water quality impacts from cement-based compounds
Whole UWF Project Effect
Cumulative Impact Magnitude: The use of cement based compounds within the catchment area of the Lower River Suir SAC mainly relates to Upperchurch Windfarm, with only very small volumes of concrete required for UWF Grid Connection or UWF Related Works in the catchment. Effects are not likely to occur, but there is potential for isolated incidents, which will be managed under the Upperchurch Windfarm Environmental Management Plan and the magnitude of effects is likely to be **negligible**.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, **Negligible** magnitude combined with the **Extremely High** Importance of the SAC; • The majority of the UWF Grid Connection is located within the River Shannon catchment, and therefore no impacts on the River Suir SAC are expected; • The very small volumes of cement required for the UWF Related Works;

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- 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 Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.6.2.2).

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11.6.4.5 Impact Evaluation Table: Surface water quality impacts due to forestry felling

Evaluation of UWF Grid Connection Excluded: As there is no tree felling in the River Suir catchment associated with the UWF Grid Connection, there is no potential for UWF Grid Connection 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 the UWF Grid Connection 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
Other Element 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	
Whole Project Information: Individual Evaluations of Other Elements of the Whole UWF Project	
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.	
Element 3: UWF Replacement Forestry	
Impact Magnitude: None	
Significance of the Impact: No Potential for Impact	
Rationale for Impact Evaluation: No tree felling associated with the UWF Replacement Forestry	
Element 4: Upperchurch Windfarm	
Impact Magnitude: A total of 4.35ha will be felled to facilitate the construction of the Upperchurch Windfarm	

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infrastructure (2013 EIS). All of the felling will be undertaken in the River Suir catchment. No significant effects on the River Suir and its tributaries was the outcome of the assessment in the 2013 EIS.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: The Sediment and Erosion Control Plan for the Upperchurch Windfarm has measures in place for control of sediment during tree felling, and therefore no significant effects are expected; and, All tree felling will be undertaken using good working practices as outlined by the Forest Service in their "Forestry Harvesting and Environment Guidelines (Forest Service, 2000a) and "Forestry and Water Quality Guidelines" (Forestry Service, 2000b).
Element 5: UWF Other Activities– *N/A, evaluated as excluded, see Section 11.6.2.2.1*
Evaluation of Cumulative Impacts – Surface water quality impacts due to tree felling
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: 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.**
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 areas required for felling relating to the UWF Related Works are small isolated areas that will be felled separate to the Upperchurch Windfarm felling, and therefore the potential for in-combination effects is negligible; • The area to be felling for the UWF Related Works accounts for only 7% of the Upperchurch Windfarm felling area.

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 Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.6.2.2).

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11.6.4.6 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 11-50 below.

Table 11-49: 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	Surface Water Quality Impacts due to Excavation Dewatering	Rationale for Excluding: no likely impact Based on trial pits undertaken at the windfarm site (which were found to be dry), no groundwater inflows into the cable trench for the UWF Grid Connection or Internal Windfarm Cabling are anticipated within the River Suir catchment. No excavations required for the UWF Replacement Forestry, therefore no potential for impact. Therefore, surface water quality impacts, arising from dewatering of trenches, on the SAC is not expected.
Tree felling in Conifer Plantations Afforestation	2,3,4	SW Runoff	Nutrient input due to tree felling	Rationale for Excluding: Neutral Impact No tree felling/harvesting required for the UWF Grid Connection, therefore no potential for impact. No tree felling/harvesting required for the UWF Replacement Forestry, therefore no potential for impact. The surface water quality effects on local surface water bodies from sedimentation as a result of tree felling for UWF Related Works or Upperchurch Windfarm were assessed to be Imperceptible and not significant (refer to Section 11.2.4.8). 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.
Operational Stage				
Runoff form Permanent hardstanding and flood risk from permanent watercourse crossing culverts	1,2,3,4	SW Flowpaths	Increased flood risk	Rationale for Excluding: Neutral Impact There are no watercourse crossing structures proposed within the SAC. The 1 no. existing culvert which may need to be replaced for UWF Grid Connection is on a small drain. All new permanent watercourse crossing structures for UWF Related Works are on small headwater watercourses which are upstream of the SAC. Effects on local surface water bodies with respect to permanent crossings has being assessed to be imperceptible because culverts

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				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. There are no new or upgraded watercourse crossings structures or hardstanding areas required for the UWF Replacement Forestry, therefore no potential for impacts.
Surface water quality impacts from runoff from permanent hardstanding surfaces	1,2,3,4	SW Flowpaths	Surface Water Quality Impacts due to Suspended solid input	Rationale for Excluding: Neutral Impact Due to the distributed nature of the permanent hardstanding infrastructure within several catchments over a large geographical area, the relatively small permanent footprint within individual local catchments and the fact that check dam 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. No groundworks or excavations required for the UWF Replacement Forestry, therefore no potential for impact.
Decommissioning Stage				
Rationale for Excluding: Neutral Impact, or no potential for impact to occur UWF Grid Connection will remain part of the National Grid. Therefore no hydrological impacts are expected. UWF Related Works: The cables will be pulled from the Internal Windfarm Cabling ducts at the turbines or at the substation; the ducting, Realigned Windfarm Roads and Haul Route Works will remain in-situ; therefore no decommissioning works to lands are required. The Telecom Relay Pole will be removed, and the compound area reinstated and returned to agricultural. Neutral effects to surface or groundwater are anticipated, and therefore neutral effects to the downstream SAC expected. The UWF Replacement Forestry will not be harvested or felled but will remain permanently in place. Therefore no hydrological impacts are expected. Upperchurch Windfarm: It is likely that the Consented UWF Substation will remain in-situ for use by ESBN and that the Consented UWF Roads will also remain in-situ for use by the landowner. Decommissioning works will be limited to the Consented UWF Turbines, Turbine Hardstanding areas, Meteorological Mast and associated drainage systems. All decommissioning works will take place from hard-core areas, with the majority of activity taking place on the turbine hardstands. Therefore, it is considered that decommissioning activities will have neutral effects to surface or groundwater, and therefore neutral effects to the downstream SAC expected.				

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11.6.5 Mitigation Measures for Impacts to Lower River Suir SAC

Mitigation measures were incorporated into the UWF Grid Connection project design, including the Project Design Measures. No additional mitigation measures are required as the topic authors conclude that **significant impacts are not likely to occur to Lower River Suir SAC**.

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. **imperceptible**.

11.6.7 Application of Best Practice and the EMP for Lower River Suir SAC

The UWF Grid Connection Environmental Management Plan also includes Best Practice Measures (BPM), which although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment. The following Best Practice Measures have been developed, for the protection of **Aquatic Habitats & Species,** by the authors of this topic chapter, using industry best practice:

GC-BPM-01	Measures for Protection of Surface Water Quality and Watercourse Morphology during instream works at Mountphilips Substation site
GC-BPM-02	Measures for Protection of Surface Water Quality and Watercourse Morphology during replacement of existing culverts along the 110kV UGC outside Mountphilips Substation site
GC-BPM-03	Design of New Permanent Watercourse Crossing Structures and Existing Culvert Replacements to Prevent Flood Risk
GC-BPM-04	Surface Water Quality Protection Measures for Site Runoff During the Mountphilips Substation Site Construction Works
GC-BPM-05	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-06	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-07	Surface Water Quality Protection Measures During Storage of Overburden at the Mountphilips Substation Site

These Best Practice Measure form part of the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

11.6.7.1 Surface Water Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Surface Water Management Plan. Water quality and the existing drainage regime will be managed under the Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection. This Surface Water Management Plan (SWMP) provides the water management framework for the appointed Contractors and Sub-contractors and it incorporates the mitigating principles described in this EIAR (particularly in this Chapter 11 – Water) to ensure that construction works are carried out with minimal impact on the surface water environment and in accordance with the mitigation measures and project design commitments made in the EIAR. The Surface Water Management Plan is part of the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

11.6.8 Summary of Impacts to the Lower River Suir SAC

A summary of the Impacts to the Lower River Suir SAC is presented in Table 11-51.

Table 11-50: Summary of Impacts to the Lower River Suir SAC

Impact to Lower River Suir SAC:	**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**	**Surface water quality impacts due to forestry felling**
Evaluation Impact Table	*Section 11.6.4.2*	*Section 11.6.4.3*	*Section 11.6.4.4*	*Section 11.6.4.5*	*Section 11.6.4.1*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction
UWF Grid Connection *Direct Impact*	**No Likely Impact**	**No Impact**	**No Impact**	**No Impact**	**No potential for impacts** **Evaluated as Excluded,** see Section 11.6.1
UWF Grid Connection *Cumulative Impact*	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**	
Element 2: UWF Related Works	Imperceptible	Imperceptible	Imperceptible	No Impact	Imperceptible
Element 3: UWF Replacement Forestry	Imperceptible	No potential for impacts	No Impact	No potential for impacts	No potential for impacts
Element 4: Upperchurch Windfarm	Not Significant	No Impact	Not Significant	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:					
Whole UWF Project Effect	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**

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

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Lower River Suir with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.6.2.2).

11.7 Sensitive Aspect No.6: Local Water Dependent Habitats

This Section provides a description and evaluation of the Sensitive Aspect - Local Water Dependent Habitats. In this EIA Report, Local Water Dependent Habitats relate to areas of wet grassland and wet heath which supports Devils Bit Scabious (plant) habitat for the Marsh Fritillary butterfly.

11.7.1 UWF Grid Connection – EVALATED AS EXCLUDED

11.7.1.1 Baseline Characteristics of Local Water Dependent Habitats in relation to UWF Grid Connection

While there is a small area of wet grassland within 50m of the new access road at the Mountphilips Substation site, there is no Marsh Fritillary habitat in this area.

The 110kV UGC outside of the Mountphilips Substation site is located entirely on public road pavements, with the last section of the route along a private paved road and in the future Upperchurch Windfarm Substation compound. While the location of the already consented Upperchurch Windfarm Substation is in a grassland field, this is in an improved grassland field and does not support Marsh Fritillary habitat.

11.7.1.2 Evaluation of UWF Grid Connection

UWF Grid Connection was evaluated for its potential to cause impacts to Local Water Dependent Habitats.

It was evaluated by the topic authors that UWF Grid Connection is not likely to cause impacts to **Local Water Dependent Habitats,** for the following reasons

- No likely effects due to the absence of suitable marsh fritillary habitat on or adjacent to construction works areas.

11.7.1.3 Cumulative Evaluation for the Other Elements *(grey background)*

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

UWF Grid Connection is not likely to cause impacts to Local Water Dependent Habitats by itself, and therefore is not likely to have a cumulative effect. However, the Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in Section 11.7.2 to 11.7.4 and included in the summary table in Section 11.7.8 in order to present the totality of the project.

11.7.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

11.7.2.1 Cumulative Evaluation Study Areas

11.7.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

The UWF Grid Connection has been excluded as a source of impacts to Local Water Dependent Habitats due to the absence of Marsh Fritillary habitat at or in close proximity (50m) of UWF Grid Connection construction works areas.

11.7.2.1.2 Whole Project Cumulative Evaluation Study Area

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

UWF Grid Connection is not likely to cause impacts to Local Water Dependent Habitats by itself, and therefore is not likely to have a cumulative effect. However, the Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included to present the totality of the project.

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6, in Volume C4 EIAR Appendices. Scoping of these Other Elements is presented in Section 11.7.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area for the evaluation of whole project effects is described in Table 11-52, and illustrated on Figure WP 11.7: Whole Project Study Area for Local Water Dependent Habitats.

Table 11-51: Cumulative Evaluation Study Area for Local Water Dependent Habitats

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	50m corridor, either side of Element works/ planting/ activity areas	Due to the shallow depth and temporary nature of the excavations associated with the construction works, the potential for impacts to local Water Dependent Habitats is limited to localised (<50m) changes to surface water runoff/groundwater flow.
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

11.7.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Local Water Dependent Habitats also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Local Water Dependent Habitats with 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 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.23).

The results of this scoping exercise are that: it is evaluated that no Other Projects or Activities are likely to cause cumulative effects with 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 Dependent Habitats.

11.7.2.2.1 Potential for Other Elements or Other Projects to cause 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 11-53.

Table 11-52: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects due to the absence of suitable marsh fritillary habitat on or adjacent to the afforestation lands.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects to Local Water Dependent Habitats due to no requirement for construction excavation work sand the absence of Marsh Fritillary habitat at activity locations.

11.7.2.3 Cumulative Information: Baseline Characteristics – Context & Character

11.7.2.3.1 Element 2: UWF Related Works & Element 4 Upperchurch Windfarm

In the Upperchurch Windfarm/ UWF Related Works Study Area, Marsh Fritillary butterfly has been mapped in wet grassland and wet heath habitat, close to Consented UWF Rooads and the Internal Windfarm Cabling at Section SW13/SW14. The Internal Windfarm Cabling will be installed within the Upperchurch Windfarm access roads at this location.

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

The wet grassland and wet heath habitat close to Consented UWF Roads/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.

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

11.7.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 11.7.2.2.1.

11.7.2.3.3 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 11.7.2.2.1.

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11.7.2.3.4 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 11.7.2.2.

11.7.2.4 Cumulative Information: Baseline Characteristics – Importance

The wet grassland and wet heath habitat supports populations of Marsh Fritillary (Annex II) and therefore has **High** importance.

11.7.2.5 Cumulative Information: Baseline Characteristics – Sensitivity

Wet grassland and wet heath habitats are sensitive to certain land use practices and specifically where drainage is being carried out.

11.7.2.6 Cumulative Information: Baseline Characteristics – Receiving Environment

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

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11.7.3 PROJECT DESIGN MEASURES for Local Water Dependent Habitats

As UWF Grid Connection is not likely to cause effects to Water Dependent Habitats, no Project Design Measures have been developed.

11.7.4 EVALUATION OF IMPACTS to Local Water Dependent Habitats

It is evaluated that UWF Grid Connection is not likely to cause impacts to Local Water Dependent Habitats, see Section 11.7.1.

This Section evaluates the likely cumulative effects of Other Elements of the Whole UWF Project (in particular the Upperchurch Windfarm and UWF Related Works) 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) - Local Water Dependent Habitats.

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

Table 11-53: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Drainage of Marsh Fritillary habitat (construction/operational stage)	**No other impacts were *excluded* from the evaluation**

The source-pathway-receptor links for the impact included are described in the **Impact Evaluation Table, which is presented in the next section 11.7.4.1.**

Note: No other impacts were excluded from the evaluation.

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11.7.4.1 Impact Evaluation Table: Drainage of Marsh Fritillary habitat

Evaluation of UWF Grid Connection Excluded: As there is no suitable Marsh Fritillary habitat within the construction works boundary (or within 50m of the construction works boundary) of the UWF Grid Connection, there is no potential for UWF Grid Connection to cause negative effect to Local Water Dependent Habitats by itself, and consequently this project cannot have a cumulative effect.

However, the Other Elements must be considered because the UWF Grid Connection 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
Other Element Impact Source: Excavations and permanent infrastructure Impact Pathway: Surface water and groundwater flowpaths Impact Description: Alteration of wet habitat drainage/hydrology within the works area as a result of temporary excavation works and permanent infrastructure and drainage. Impact Quality: Negative	
Whole Project Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 2: UWF Related Works	
Impact Magnitude: Wet Grassland / Wet Heath has been mapped along the Internal Windfarm Cabling at Section SW13/SW14 (for 170m). The wet habitat mainly exists upslope of the works, and therefore effects are likely to be negligible.	
Significance of the Impact: Imperceptible	
Rationale for Impact Evaluation: • As per Table 11-7, Negligible magnitude combined with the High Importance of the habitat; • The works at route Sections SW13/SW14 will only comprises a temporary trench, and therefore any minor effects will be temporary; • The works are downslope of the wet habitat; • The shallow and temporary nature of the cable trench; • The cable will be installed within the permitted windfarm access road; • All effects will be brief to temporary and reversible.	
Element 3: UWF Replacement Forestry– *N/A, evaluated as excluded, see Section 11.7.2.2.1*	
Element 4: Upperchurch Windfarm	
Impact Magnitude: The Consented UWF Roads will be constructed through the same area of marsh fritillary habitat as the UWF Related Works above. The habitat is mainly on the upslope side of the works.	
Significance of the Impact: Not Significant	
Rationale for Impact Evaluation: • The works are mainly downslope of the wet habitat; and, • The natural surface water / groundwater drainage regime in the area is to be maintained by the windfarm drainage.	
Element 5: UWF Other Activities– *N/A, evaluated as excluded, see Section 11.7.2.2.1*	

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Evaluation of Other Cumulative Impacts – Drainage of Marsh Fritillary habitat
Whole UWF Project Effect
There is potential for cumulative Impacts of the UWF Related Works and the Upperchurch Windfarm, where the Internal Windfarm Cabling at SW13/SW14 will be installed within the Consented UWF Roads, and therefore in-combination effects are likely to be **Small Adverse**. The natural surface water / groundwater drainage regime in the area is to be maintained by the windfarm drainage. There is no potential for in-combination effects on the wet habitats due to the UWF Grid Connection.
Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • As per Table 11-7, Small Adverse magnitude combined with the High Importance of the habitat; • The Internal Windfarm Cabling at SW13/SW14 will be installed within the Consented UWF access roads. • The consented windfarm drainage design will maintain the existing drainage regime.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to the Local Water Dependent Habitats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.7.2.2).

11.7.5 Mitigation Measures for Impacts to Local Water Dependent Habitats

Mitigation measures are not relevant as no impacts are likely to occur to Local Water Dependent Habitats as a consequence of the UWF Grid Connection.

11.7.6 Evaluation of Residual Impacts to Local Water Dependent Habitats

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Grid Connection (Section 11.7.1), i.e. No likely impacts.

11.7.7 UWF Grd Connection Environmental Management Plan

The Project Design measures will be implemented by the Project Manager and the main Contractor during the construction stage, under the Environmental Management Plan for the UWF Grid Connection (EMP). The EMP is appended to this EIA Report as Volume D.

The EMP will be an important contract document for the main construction contractor (Contractor) who will be contractually obliged to comply with the EMP. An Environmental Clerk of Works will be appointed, who will be independent of the construction Contractor, and it will be the responsibility of the Environmental Clerk of Works to monitor the compliance of the Contractor with the EMP through liaising with the Construction Site Manager and the Project Manager, monitoring construction works on a daily basis and by carrying out regular audits on EMP compliance. The Environmental Clerk of Works will be resouced to employ a team of environmental specialists including a Site Ecologist, Site Hydrologist and an Invasive Species Specialist.

11.7.8 Summary of Impacts to Local Water Dependent Habitats

A summary of the Impacts to Local Water Dependent Habitats is presented in Table 11-55.

Table 11-54: Summary of the impacts on Local Water Dependent Habitats

Impact to Local Water Dependent Habitats:	**Drainage of Marsh Fritillary habitat**
Evaluation Impact Table	*Section 11.7.1*
Project Life-Cycle Stage	Construction/ Operation
UWF Grid Connection *Direct Impact*	**No Likely Impact Evaluated as Excluded, see Section 11.7.1**
UWF Grid Connection *Cumulative Impact*	
Element 2: UWF Related Works	Imperceptible
Element 3: UWF Replacement Forestry	No Potential for Impacts Evaluated as Excluded, see Section 11.7.2.2.1
Element 4: Upperchurch Windfarm	Not Significant
Element 5: UWF Other Activities	No Potential for Impacts Evaluated as Excluded, see Section 11.7.2.2.1
Cumulative Impact	
All Elements of the Whole UWF Project (only relates to Upperchurch Windfarm and UWF Related Works)	**Slight**

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

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities were evaluated as having potential to cause cumulative effects to Local Water Dependent Habitats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 11.7.2.2)

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11.8 Reference List

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