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

REFERENCE DOCUMENT 19 of 36

This document contains the following:

UWF Grid Connection (ABP ref. ABP-306204-19)

- **2019 UWF Grid Connection EIA Report - Volume C2: EIAR Main Report (1 of 2)**
  - Executive Summary of the EIAR Chapters
  - Chapter 1 – Introduction
  - Chapter 2 – The EIAR Process including Scoping
  - Chapter 3 – The Scoping Consultations
  - Chapter 4 – Alternatives Considered
  - Chapter 5 – Description of the Development – UWF Grid Connection
  - Chapter 6 – Population
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UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapters 1 - 19

ECOPOWER

October 2019

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UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Executive Summary of the EIAR Chapters

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Executive Summary of the Introduction Chapter

The current subject application is for a grid connection for the already consented Upperchurch Windfarm.

The subject application for the UWF Grid Connection is being made directly to An Bord Pleanála under Section 182A (9) of the Planning and Development (Strategic Infrastructure) Act (2006). This is the 2nd Application for UWF Grid Connection. The previous application was refused by An Bord Pleanála on 17/12/2018 (ABP-301959-18). This 2nd Application takes account of the Reasons for Refusal and the ABP Inspector's Report on the Application.

This Application is technically comparable to the previous application, with the main exception that the 110kV UGC has changed from a generally cross country route in the previous application to a wholly road route in this Application, the Mountphilips Substation is also slightly larger and with a different layout than the previous application in 2018.

The UWF Grid Connection proposal comprises of the following elements

- Mountphilips Substation
- Mountphilips – Upperchurch 110kV Underground Cable (110kV UGC) and,
- Ancillary Works at Mountphilips Substation site.

The purpose of UWF Grid Connection is to export electricity, from Upperchurch Windfarm when it is constructed and operational, to the national grid. The 110kV UGC will connect the Consented UWF Substation at Upperchurch Windfarm to the now proposed substation at Mountphilips, and the new Mountphilips Substation will be connected to the existing, adjacent Killonan - Nenagh 110kV overhead line. The export of electricity from Upperchurch Windfarm will be via the new Mountphilips Substation.

The subject application is part of a whole project which also comprises the following other elements – UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities. These are collectively referred to as the Whole UWF Project in this EIA Report, and are included in the cumulative evaluations within this Report.

Executive Summary of the The EIAR Process Chapter

Legislative Context

These application documents have been prepared in compliance with the requirements of the EIA Directive, meaning European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment.

The EIA Report

In the EIA Report, the following environmental factors or topics are examined by competent experts - **Population; Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets (Built Services); Material Assets (Roads); Cultural Heritage and Landscape**. These chapters describe the Baseline Characteristics of the Environment; Baseline Information sources; Evaluation methodology, Scoping and identification of Sensitive Aspects; Evaluation of each Sensitive Aspect which includes a description of the baseline environment, the relevant Project Design Environmental Protection Measures; an evaluation of the effects of UWF Grid Connection directly, indirectly and cumulatively with off-site projects (Other Elements of the Whole UWF Project) and other projects and activities; an evaluation of the whole project effects; Mitigation Measures for any significant effects, and Evaluation of Residual Impact; followed by a summary table with the predicted impacts for each Sensitive Receptor. An **Executive Summary (technical summary), including Sensitive Receptors; Summary Baseline and Summary Impact evaluation and values, is presented at the start of each chapter.**

Where available topic specific industry guidance and best practice has been used. Where there are no specific guidelines on evaluating the baseline environment and assessing the effects of the proposal on a specific environmental topic, the methodology used is a standardised EU methodology – the IMPERIA methodology. The terms used to describe effects are per EPA definitions from 'EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports' (draft August 2017).

Presentation of the EIA Report

Accessibility, legibility and clarity were the key considerations when organizing the layout of the EIA Report Chapters. In this EIAR Main Report (Volume C2), the information in the Environmental Factor topic Chapters 6 to 17, is prepared by different **competent experts** but presented in the chapters using a **standardised structure** with a **pre-defined layout, terms and definitions; standard evaluation processes (including scoping) and standard descriptive methods and impact descriptions** in order to ensure that all likely and significant effects are clearly communicated, placed in context and easily cross-referenced.

- So that the information for the cumulative evaluation is clearly distinguishable from the information on the actual development being applied for, all cumulative information sections are highlighted in grey.
- **Mapping and Illustrations, including maps, plans, sections and diagrams** are presented in a **separate volume** – **Volume C3: EIAR Figures** so that they can be prepared at a scale that is legible and so that they do not distract from the flow of the text. Volume B comprises the technical Planning Drawings.
- **Appendices** have been used for including detailed or supplementary information and photographs that are not core to the EIA Report but which nonetheless provide a more detailed understanding, or technical scrutiny of important issues. These are contained in a **separate volume – Volume C4 EIAR Appendices**.
- A Technical **Executive Summary** is presented at the start of each chapter.

A **Non-Technical Summary** is presented in a handy, short separate volume with figures included – **Volume C1: Non-Technical Summary**.

Executive Summary of The Scoping Consultations Chapter

Article 6 of the EIA Directive requires consultations with two different groups on the content of the EIA Report – (1) public authorities and NGOs who are likely to be concerned, and (2) the public.

The **principal bodies consulted, who engaged with the EIA Report Team**, included

- An Bord Pleanála (Strategic Infrastructure Division)
- Tipperary County Council (Planning and Roads Departments)
- Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs; Development Application Unit (DAU)
- National Parks and Wildlife Service (NPWS)
- Inland Fisheries Ireland (IFI)
- Irish Water
- Transport Infrastructure Ireland (Tii)
- National Federation of Group Water Schemes.

As well as personal contact with landowners associated with the Mountphilips Substation and the Consented UWF Substation and landowners generally involved in the consented Upperchurch Windfarm, part of the public consultation included a **Public Consultation and Information Day.**

The public are informed before the Planning Application is lodged with An Bord Pleanála, through the EIA Portal hosted by the Department of Housing, Planning and Local Government. Also, the planning documents submitted to An Bord Pleanála, are available for inspection at their office at 64 Marlborough Street, Dublin 1, and on the Applicant's **dedicated project website at www.upperchurchwindfarmgridconnection.ie.**

Executive Summary of the Alternatives Considered Chapter

This Consideration of Alternatives chapter examines the alternatives for **Grid Connection Node Location; Grid Connection Technology (Overhead Line v Underground Cable); Alternative Public Road Routes for the Underground Cable; Alternative locations for Mountphilips Substation; Alternative Processes** and the **'Do-Nothing' Alternative**.

Grid Connection Locations

The sustainable and efficient use of the national grid infrastructure underpins the Eirgrid/ESBN Group Processing Approach which was implemented in the 'Gates' Grid Connection process. The assignment of connection points for new renewable electricity generation to the national grid requires in-depth planning and technical investigations to identify the optimum connection point for each Group where the reliability and safety of the grid would be maintained.

Limerick City is the nearest 'load centre' (electricity user) with the capability to use the large amount of electricity generation from Upperchurch Windfarm and it is technically practical, efficient and sustainable to connect a large generator to the national grid at a location on the network close to a suitably large load centre, without undermining the stability and safety of the grid. The Killonan Station is located 5km to the southeast of Limerick City centre, and is one of the main transmission system stations in the country. The Killonan Station forms the main bulk supply point for the Mid-West region – power is distributed through the Killonan Station using numerous regional networks at all voltages (110kV, 38kV and 20kV). One of these regional networks is the Killonan to Nenagh 110kV OHL, which is c.41km long, originating in the Killonan 220kV Station and ending in the Nenagh 110kV/38kV Substation. The Killonan – Nenagh 110kV OHL is one of the main electricity supplies into Nenagh town. Unlike the Killonan Station, the Killonan – Nenagh 110kV OHL has capacity to take the substantial amount of electricity which will be generated by Upperchurch Windfarm. This is why a connection at a new node on the Killonan to Nenagh 110kV line was allocated to Upperchurch Windfarm under Gate 3 in the first place.

There are strict criteria for applying for a modification to the allocated grid connection node. A Modification Request to change the connection node on the national grid, from the one allocated for Upperchurch Windfarm under it's Gate 3 Grid Connection Agreement, would not be considered acceptable by the System Operator because there is not enough available electrical capacity at other 110kV stations (i.e. Nenagh, Thurles, Tipperary and Cauteen Stations) in the region to accept the large amount of electricity that Upperchurch Windfarm will generate. The Killonan Station does not have the capacity to take this volume of electricity without requiring major station works, including extension works. The location of the grid connection point has been planned in the context of the available capacity on an overhead line (i.e. Killonan – Nenagh 110kV OHL) which connects to the main bulk supply point for the Mid-West Region – i.e. Killonan Station, which is located beside a suitably large load centre, (i.e Limerick City) to accept the large electricity generation capacity of Upperchurch Windfarm. The connection will be via a new looped in substation beside the overhead line at Mountphilips. This new substation will increase the Limerick/Tipperary transmission system security, increase the Killonan-Nenagh 110kV OHL stability and improve the system circuits Control and Protection.

Therefore, having examined alternative connection nodes (locations) for connecting Upperchurch Windfarm to the national grid, there was no other technically feasible alternative to the connection point prescribed in the ESBN Grid Connection Agreement (a new node to be built at Mountphilips along the Limerick to Nenagh 110kV line), and the prescribed connection node was considered to be the optimum location for connection to the national grid.

Grid Connection Technology (OHL v UGC)

Of the 2 no. alternative technologies – Overhead Line (OHL) and Underground Cable (UCG), neither technology was considered likely to cause significant effects. Overhead Line technology will have minimal effect on Public Roads or Road Users, but because of the technical requirements of Overhead Line technology, the OHL would need to be routed through the open countryside, which places construction works within natural habitats and close to watercourses. Moderate negative effects could occur to Biodiversity and Water receptors as a result. Because of its above ground characteristics, moderate negative effects to Landscape could also occur in this rural setting.

On the other hand, although Underground Cable technology will have negative Slight to Moderate effects on Road Users or to Public Roads; it is because of its location on public roads, that effects to natural habitats are avoided, and effects to animal species and watercourses are minimised.

When the emphasis is placed on the natural environment the use of underground technology (in public roads) is a better alternative than Overhead Line technology and therefore the underground cable alternative was chosen for the grid connection technology to the connection Node prescribed in the Upperchurch Windfarm Grid Connection Agreement.

Alternative locations and designs for the Mountphilips Substation

3 no. alternatives were considered for Mountphilips Substation – Gas Insulated Switchgear (GIS) substation on the western side of the OHL, GIS substation on the eastern side of the OHL or Air Insulated Switchgear (AIS) substation on the eastern side of the OHL. GIS on the western side of the OHL is likely to cause significant effects due to the requirement for outages of the Killonan to Nenagh 110kV OHL for a period of c.6months, while the OHL is not the only source of electricity into Nenagh town and surroundings, it is the main source, and an outage of this length presents a serious risk of electricity supply interruption in the Nenagh area, and is not considered to be acceptable.

While neither design at Site B is likely to cause significant effects, when the emphasis is placed on the natural environment it was considered that 'AIS at Site B' had least potential to cause significant effects to the natural environment due to the much smaller size of buildings within the substation and the shallow depth of excavations, and therefore 'AIS at Site B' was chosen for the location and design of the Mountphilips Substation.

Alternative Public Road Routes for the UGC

Three routes were considered; (1) Local Road through Toor, (2) R503 (through Newport), and (3) R503 (avoiding Newport).

In relation to effects to hen harrier, the 'Local Road through Toor' option is routed along very lightly trafficked local roads through a sparsely populated area, whereas the 'R503' routes are on busier roads through more densely populated areas. The baseline environment along the 'Local Road through Toor' route is considered to be a quiet rural area and it is considered that construction works will present a noticeable contrast to these quiet baseline conditions and therefore there is greater potential to disturb or displace hen harrier. On the R503 routes, by comparison, there are much higher volumes of traffic, much higher number of houses and development and a generally higher level of baseline activity and noise from the vicinity of the regional road and the local roads around Newport town.

In relation to the Lower River Shannon SAC, the Local Road through Toor is routed in close proximity to the SAC, which increases the potential for effects. The R503 routes on the other hand, are at least 1km from the SAC at the majority of works locations.

When the effects on Public Roads and Road Users is taken into account, 'Local Road through Toor' option will have low levels of effects mainly due to the very low number of road users and population in this area; when the two R503 options are considered, the 'R503 (avoiding Newport)'route is preferable to the 'R503 (through

Newport)' route because of the ability to avoid traffic delays and road works in the town, and avoid affecting the Tipperary County Council planned pavement works in Newport Town which are scheduled for 2019.

Of the 3 no. alternative routes for the Underground Cable, none of the routes was considered likely to cause significant effects. When the emphasis is placed on biodiversity matters in this particular examination (the 3 No. alternative public road routes), either of the 'R503 routes' are preferable to the 'Local Road route through Toor' route, when the Hen Harrier species and the Lower River Shannon SAC is considered. When the effects on Material Assets are also taken into account, the R503 (avoiding Newport Town) is the best alternative. Therefore the **R503 (avoiding Newport Town) route alternative was chosen for the UGC route** to the connection Node prescribed in the Upperchurch Windfarm Grid Connection Agreement.

Alternative Processes

An examination of the processes associated with the project, by the Design and EIAR evaluation teams, resulted in alternative processes being devised to avoid, prevent or reduce environmental effects. These alternative processes are an intrinsic part of the design of the UWF Grid Connection project. These included the scheduling of construction works in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands; the sequencing of watercourse crossing works, earthworks, dewatering and excavation dewatering within 50m of a watercourse; the scheduling of construction works along the 110kV UGC to occur outside of the hen harrier breeding season; and the design of security lighting and restriction of construction works to daylight hours to minimise effects to bats.

The 'Do Nothing' Alternative

The very high impact of Climate Change to biodiversity and to our human wellbeing, is reflected in the Irish Oireachtas declaring a climate and biodiversity emergency on the 9th May 2019.

The most significant impact of UWF Grid Connection not being developed is the secondary impact of Upperchurch Windfarm not being developed; this would be a **significant lost opportunity to contribute to Ireland's action on Climate Change remediation.**

In the 'do-nothing' alternative, **not developing the Upperchurch Windfarm project means that** there will be a consequential loss of the carbon offset potential and **the emission of 106,216 tonnes of greenhouse gases every year from the generation of electricity by fossil fuel plant would not be avoided**.

Executive Summary of Description of the Development – UWF Grid Connection

UWF Grid Connection: Location and Characteristics

The subject development, UWF Grid Connection, will comprise of the following:

Mountphilips Substation: A new 110kV substation is proposed for a location adjacent to the existing Killonan - Nenagh 110kV overhead line in agricultural grassland in Mountphilips townland, 2km north of Newport, 4km south of Birdhill, 17km north east of Limerick City and 23km west of the Upperchurch Windfarm. The new 110kV electrical substation will comprise a substation compound, 230 meters east of the overhead line and c. 10290m^2 in area, which will contain a control building; 110kV busbars; circuit breakers; cable chairs; surge arresters; lightening protection monopoles (c.18m in height); and other electrical plant and apparatus; the Mountphilips Substation will also comprise 2 No. End Masts (c.16m in height) located under the existing Killonan – Nenagh 110kV overhead line and underground cabling between the End Masts and the electrical equipment in the Substation Compound will connect the new substation to the existing overhead line. Secure palisade perimeter fencing with gates will surround the compound.

Ancillary Works at the Mountphilips Substation site will support the construction and operation of the Mountphilips Substation and includes the widening of an existing farm entrance to provide a new Permanent Entrance at Coole townland; a permanent Access Road from the new Entrance to the substation compound; the installation of drainage systems at the Substation Compound and along the new Access Road, a temporary construction stage Compound at the Substation Compound; construction of new watercourse crossing structures (1 No. temporary and 2 No. permanent); temporary road to End Masts, and temporary crane hardstand at the End Mast location; hedgerow/tree removal and hedgerow and tree planting at the site entrance and along the new Access Road; fencing at the entrance, along the new Access Road and around the Substation Compound; provision of local electricity supply to Mountphilips; excavation and storage of soils and reinstatement works.

Mountphilips - Upperchurch 110kV UGC: The 110kV UGC will connect the new Mountphilips Substation to the Consented UWF Substation by 30.5km of underground cabling. At the Mountphilips Substation site, the 110kV UGC will be constructed under the new permanent access road. Outside of the Mountphilips Substation site, the route of the 110kV UGC is entirely on roads, mostly on the Limerick to Thurles Regional Road (R503). There is a short section of the 110kV UGC planned for under the network of Local Roads around Newport Town – between the proposed Mountphilips Substation site entrance at Coole, via Rockvale and Ahane to the R503 at Newport GAA Club, and Local Roads are also used at the eastern extent of the 110kV UGC, in Knockmaroe and Knockcurraghbola Crownlands townlands. The last section of the route is on a private paved road to the Consented UWF Substation location. The route bypasses Newport; passes through the village of Rear Cross; passes through the Slieve Felim to Silvermines Mountain SPA for 8km (entirely on the R503); crosses the boundary of the Lower River Shannon SAC at 6 No. points. Outside of the Mountphilips Substation site, the 110kV UGC will cross 65 No. watercourses, all of these crossings will be over or under existing watercourse crossing structures.

The 110kV UGC will be installed in trenches (c.1.25m deep and 0.6m wide), which will be laid with 5 cable ducts through which the 3 electrical cables, communications cables, and copper cables (if required), will be pulled. The cables will be pulled through the ducts and joined together in joint bay, communication and link box chambers located at regular Joint Bay points (38 No.) along the route. The ducts will be surrounded by concrete, and red cable protection strip, yellow warning tape, protective plates will be placed in the trench before the top of the trench is backfilled and reinstated. The only surface expression of the 110kV UGC will be the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates along the route. The design of the Mountphilips – Upperchurch 110kV UGC complies with ESB Networks specifications and technical and operational requirements.

Works and Activities for Mountphilips - Upperchurch 110kV UGC include;

- Traffic management around the construction works along the public road network will be managed along most of the route of the 110kV UGC with one-lane closures. However, due to the narrow nature of some of the roads, the Local Roads at Foildarrig / Oakhampton, Castlewaller / Carrowkeale /Derryleigh and Knockmaroe will need to be closed for between c.1 – 4 weeks. Local Access will be maintained. The closure will not be continuous throughout a given day, will occur during daylight hours but outside of local peak or important traffic periods. There are alternative traffic routes to avoid the works available on all of these roads.
- The works along the public road network will be scheduled to minimise impacts on schools and local businesses and will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.
- All excavated material from the 110kV UGC trenches in the roads outside of the Mountphilips Substation site will be classed as spoil and will amount to 23,380m^3, all of which will be removed to appropriately licensed waste facilities. There will be no storage of excavations outside of the Mountphilips Substation site.
- Along the 110kV UGC route on the public road, confirmatory road condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken. The roads will be reinstated according to the conditions of the Road Opening Licence, and will involve a combination of carriage lane reinstatement and full road reinstatement. The Promoter will fund the costs of Tipperary County Council engaging a chartered Civil Engineer to over-see quality control and compliance with drawings, specifications and road opening conditions for the duration of the works.
- Underground services, mainly comprising water main pipes, occur under most of the roads to be used for the 110kV UGC. Before construction, the services owners will be consulted and confirmatory surveys would be carried out ahead of works. In addition, the excavation works will be supervised by a banksman, and a supply of repair materials will be stocked at works locations.
- There will be 63 No. water crossings along the public road between the Mountphilips Substation site and the turn off for the Consented UWF Substation site. There are 2 No. crossings on the private paved road at Knockcurraghbola Commons to the Consented UWF Substation site. The watercourses range in size from rivers and streams to drains, and various crossing structures are already in place at all of these watercourses. The existing crossing structures comprise 15 No. bridges and 50 No. culverts (both box culverts and pipe culverts). The level of the road over the bridges and works to raise the height of the bridge parapet walls will be required at 3 No. bridges along the 110kV UGC route. In addition the existing culvert may require replacing at upto 13 No. of these watercourse crossing points which are mainly along the regional road.

Mitigation Measures

Project Design Environmental Protection Measures: The design of UWF Grid Connection includes 69 No. Project Design Environmental Protection Measures (Mitigation Measures) as per the schedule listed in Section 5.2.3 of this Chapter 5: Description of Development; also listed in Chapter 19: Mitigation Measures & Monitoring Arrangements of this EIA Main Report and in the Environmental Management Plan in Volume D. These mitigation measures were devised at the design stage of the project and during the EIAR process to avoid, prevent or reduce likely or potentially significant effects on the environment.

The project design environmental protection measures will be implemented through the Environmental Management Plan. 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.

UWF Grid Connection: Construction & Operation

UWF Grid Connection Construction Phase

Construction of the UWF Grid Connection is expected to commence in 2020/2021 and will take approx. 12 to 18 months. Up to 100 persons will be engaged in the construction of the UWF Grid Connection. Construction materials will be delivered to works areas consisting of a total of 1360 No. loads of concrete; 1350 No. loads of aggregate; and 210 No. loads of surface dressing (public road) which will be imported from Roadstone Killough, Co Tipperary; Roadstone Bunratty, Co Clare; and Rearcross Quarry, Shanballyedmond Rear Cross, Co Tipperary. Other deliveries relate to general building materials which will be delivered to the temporary compound at the Mountphilips Substation site and include cabling & ducting electrical plant and equipment, including switching gear, lattice towers, geotextile materials, fencing and hedging. These materials will be imported to the site from various suppliers throughout Ireland and the EU.

UWF Grid Connection Operational Phase

Once commissioned and energised, the UWF Grid Connection will be taken in charge by ESB Networks and the Mountphilips Substation and 110kV UGC will become part of the national electricity network. The new asset will be managed and operated by ESB Networks. Scheduled inspection and maintenance activities will be carried out by ESB Networks personnel (2 men crews) over a total of 13 days per year for the Mountphilips Substation and 110kV UGC. Very infrequent planned maintenance or unplanned repairs may be required, if at all, during the lifetime of the UWF Grid Connection, it is expected that planned maintenance or unplanned repairs, should they occur, will involve works at Joint Bay locations and will require one crew with c.6 ESB Networks personnel and machinery for 1 week – 2 weeks duration, depending on the nature of the repairs work. The UWF Grid Connection will remain permanently in place as part of the national electricity network and thus decommissioning is not envisaged.

UWF Grid Connection Use of Natural Resources

Construction Phase: There will be 4.8 hectares of agricultural **land** required for the construction works site. The remaining construction works areas relate to public road/built environment, which are not classified as a natural resource. No forestry will be felled for UWF Grid Connection. In relation to **biodiversity**, in total, 200m of hedgerow/earthen bank and 21 No. trees of varying maturity will be permanently removed, at the Mountphilips Substation site. A new hedgerow with semi-mature trees will be planted behind the new sightlines at the entrance. Also, an additional 700m of new hedgerow will be planted on the permanent berm to be created alongside the new Access Road between the Site Entrance and Mountphilips Substation. A mix of local provenance native species will be used. The berms around the substation and the side of the berms along the new access road will be sown with a mix of grasses and local provenance native wildflower species common to the surrounding vegetation. **Water** required for welfare facilities will be brought onto site. Approximately 5,300m^3 of soils (comprising topsoils, subsoils and rock) will be excavated from the works areas at the Mountphilips Substation site. Approximately 18,810m^3 of subsoils and rock will be excavated from road pavements along the route of the 110kV UGC outside the Mountphilips Substation site.

Operational Phase: Once the Development is constructed, the requirement for **lands** will reduce to 1.75ha, comprising the footprint of new permanent infrastructure within the Mountphilips Substation site. The agricultural lands will be reseeded with grass and returned to agricultural use. In relation to **biodiversity**: no further **hedgerow** or **tree pruning or removal** will be required during the operational stage. Non-potable **water** requirements will be provided at the Mountphilips Substation via a rain water harvesting system, and drinking water will be brought onto site as needed. No excavations of **soils** will be required during the routine operation of the UWF Grid Connection. Planned maintenance or unplanned repairs, if any occur are likely to involve the re-opening of the underground chambers, at Joint Bays along the public road. This work is not likely to involve the excavation of any natural material.

UWF Grid Connection Emissions

Dust, construction machinery exhaust, noise, vibration and light will be emitted during the construction stage, however levels will not cause significant impacts. Negligible levels of dust and machinery exhaust are associated with operational and maintenance activities. During operation, Mountphilips Substation will emit **noise** however this is not likely to be audible above the existing background noise levels at nearest residence, which is 385m distant. The operational Mountphilips Substation and 110kV UGC will be a source of very low frequency (50Hz) electromagnetic fields, levels will be substantially under threshold limits.

UWF Grid Connection Waste

Waste water from construction stage welfare facilities will be contained in self-contained units and emptied by a licenced facility. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at the Temporary Compound at the Mountphilips Substation site. Waste will be collected by an appropriately licensed waste contractor. Any wastes which result from the construction of the UWF Grid Connection will be managed under a specific **Waste Management Plan**. Bitumen bound surface dressing, base layer aggregates, subsoil and rock will be excavated from the public road for the 110kV UGC trenches and joint bay locations. All of this material will be classed as spoil and will amount to 23,380m^3, all of which will be removed to appropriately licensed waste facilities. Excavated material from the sections of the 110kV UGC within 15m of an Invasive Species infestation, will be classed as Hazardous Waste and disposed of as potentially contaminated material, by a licensed contractor to a suitably licensed waste facility. This amount to c.760m^3 of the total 23,380m^3 of excavated material.

There will be minimal general and chemical waste during the Operational Stage, with any waste taken offsite by ESBN personnel.

Vulnerability of UWF Grid Connection to Major Accidents and/or Disasters

The UWF Grid Connection **is not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles and very small volumes of grease and sulphur hexafluoride (SF6) gas used at the Mountphilips Substation. There are **no Seveso sites in proximity** to the site. **It is Extremely Unlikely that the development will cause a flooding disaster** because of the underground nature of the 110kV UGC, the location of the UWF Grid Connection predominantly outside of flooding areas, the fact that all permanent hardstanding at the Mountphilips Substation site will have runoff control measures and all new permanent watercourse crossing structures will be sized for peak flood flows. **It is Extremely Unlikely that a lands slippage event will occur** due to the stable soils at Mountphilips Substation and the location of the routing of the cabling along the public roads. **The development is not susceptible to extreme weather events as a consequence of climate change** such as flooding, high winds or temperature extremes due to the location of the 110kV UGC underground and within road pavements/built surfaces, and due to the design of the electrical plant at Mountphilips Substation which will be able withstand temperature variability and exposure in the open countryside. Should a Major Accident or Disasters occur, unconnected to the Whole UWF Project, but in the locality – environmental protection measures have already designed into the project which will ensure that the project will not make the consequences of the event worst. Additionally, the presence of the project will not increase the likelihood of Major Accidents or Disasters occurring.

Other Projects Considered

Under the EIA Directive, the totality of a project must be considered which includes off-site related projects, secondary project and other unrelated projects and activities.

Off-Site Project - The Whole UWF Project

Off-site projects are projects which are which are integral to the subject project. The subject application (UWF Grid Connection) is part of a whole project which comprises the following other related off-site projects – UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities. These are collectively referred to as the Whole UWF Project in this EIA Report. The purpose of the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities elements is to facilitate the construction and operation of the already consented Upperchurch Windfarm.

Secondary Projects

Secondary projects are projects that arise largely because of the existence of the principle project, though they are not usually carried out by the developer of the principle project. No secondary projects are currently known or planned to occur as a result of the existence of the UWF Grid Connection.

Other Projects or Activities

Other Projects or Activities relate to existing or consented (or proposed or in some cases *potential*) projects and on-going activities in the area, which are not connected to the subject project, and which by addition could create larger more significant effects to the environment. Other Projects & Activities in the area were scoped for inclusion in this assessment, using geographical and time-frame boundaries and conceptual site model exercises. Other Projects include the existing Killonan to Nenagh 110kV Overhead Line, existing Shannonbridge – Killonan 220kV Overhead Line, *potential* Bunkimalta Windfarm; consented Castlewaller Windfarm and *potential* associated grid connection; existing Milestone Windfarm; all operating wind turbines in the Irish State; existing Rear Cross Quarry; existing Foilnaman Mast; existing Cummermore Communications Pole; proposed Quarry at Curraghduff; consented Newport Town Park; and the recently proposed Lackamore Glamping Site. Other Activities include general agriculture, forestry and turf cutting activities which are on-going in the wider surrounding area.

Executive Summary of the Population Chapter

Baseline Environment: Impacts on population are considered in the context of the local economy. The Study Area for the Local Economy is the Electoral Divisions (EDs) surrounding the development and includes the town of Newport and the villages of Rear Cross, Upperchurch and Hollyford in County Tipperary, and the town of Cappamore and the village of Murroe in County Limerick.

Survey Results for Sensitive Aspects in the Baseline Environment: The latest Census figures, Tipperary and Limerick County Development Plans and the GeoDirectory Database of Business and Residential Premises in the area were examined, along with a site visit to the area, to identify local services and businesses. There are no local residents in close proximity to the Mountphilips Substation site. Along the route of the 110kV UGC, residents and businesses are concentrated in and around Newport town and Rear Cross village. According to Census 2016, a significant proportion of the local workforce commutes to work, with the key employment sectors in the area being Commerce & Trade and Professional Services, so it is likely that they are accessing employment opportunities in the nearby urban areas, notably Limerick, Thurles and Nenagh. Agriculture and forestry are important sectors within the upland area, accounting for almost 10% of business premises and 13% of the workforce, higher than the State average of 4%. Tourism is relatively strong in Tipperary County however much of this concentrated in South Tipperary. Outside of Newport town, there are low numbers (c.12) of accommodation and food services in the study area. There are a number of walks and trails within the area; of these trails part of the Slievefelim Way walking trail and the Ormond Way Cycle route overlap the route of the 110kV UGC. A scenic driving route is also routed along the regional R503 and R497 regional roads in the upland area.

Summary of the likely Impact on Local Economy: There will be c.100 persons working directly on the UWF Grid Connection project, most of them on-site, over the course of the construction phase; c.€900,000 will be paid to local landowners, in the form of wayleave agreements and land purchases; c.€1.5 million will be spent regionally on Stone & Concrete from Rear Cross Quarry (Holycross) and Roadstone (Bunratty) and c.€500,000 induced expenditure on locally sourced goods and services will be created. The impact is evaluated as **Neutral (Positive)** because the additional GVA generated, €2.9million, is equivalent to approximately 1% per cent of the overall size of the local economy in the Study Area, in the year of construction; and because of the temporary duration of the construction stage. **Summary of the likely Cumulative Impact:** The UWF Grid Connection will be constructed with the Other Elements of the Whole UWF Project, notably Upperchurch Windfarm, and could also *potentially* be constructed during the same period as Castlewaller Windfarm and Bunkimalta Windfarm. The cumulative Gross Value Added for the 3 renewable energy projects (€7.35 million to €11.35 million), should they be constructed during the same period, is expected to be approximately 4% to 5% of the value of the local economy and therefore the cumulative significance is evaluated as an **Imperceptible (Positive)** Impact.

Other Population receptors/impacts: The Local Economy during the construction phase, was deemed to be the only Sensitive Aspect of Population which could be materially affected by the UWF Grid Connection and therefore was brought forward for evaluation more in-depth evaluation in this Population chapter (as summarised above). **Other likely impacts that could affect Population** are evaluated more directly in the other topic chapters. Effects on human health is evaluated in Chapter 7: Human Health; Effects of disruption to land users during construction are evaluated Chapter 9: Land; Effects to people of construction dust and noise, and operational noise and electromagnetic fields are evaluated in Chapter 12: Air; Potential effects to local people of interruption to water supply are evaluated in Chapter 14: Material Assets (Built Services); and Effects on road users of traffic disruption are evaluated in Chapter 15: Material Asset (Roads).

Conclusion: The UWF Grid Connection will not cause significant adverse effects to Population, effects will be positive.

Executive Summary of the Human Health Chapter

Baseline Environment: The environment in which people live, work and use recreationally is characterised by good air quality with very low background concentrations of air pollutants; normal rural and road traffic background noise levels; two high voltage (110kV and 220kV) overhead lines in the vicinity of Coole/Mountphilips; the area is generally serviced by overhead electricity lines and overhead telephone lines and many residents and community facilities have access to public water supply, particularly in the Newport area, in Rear Cross and along the R503; and the roads in general are lightly trafficked.

Survey Results for Local Residents & Community and Transient People in the Baseline Environment: There are 391 No. local residences and 19 No. public & community facilities within 350m of construction works. A total of 301 No. of the local residents and 33 No. of the public & community facilities are located within 50m of construction material haul routes. In relation to the potential for electromagnetic field related effects, there are no residents or community facilities within 100m of Mountphilips Substation and 317 No. local residences and 17 No. public & community facilities (2 of which are schools) within 100m of the 110kV UGC along the public road.

The surrounding area is comprised of agricultural land and countryside, with a number of minor roads and waymarked trails where transient receptors may be present either travelling, recreationally, or working on the land. The Slievefelim Way and Ormond Way (cycle) are routed through the UWF Grid Connection study area.

Results from other Topic Chapters: The authors reviewed other topic chapter results in order to evaluate likely cross-factor effects to Human Health. Likely effects reported in Chapter 6: Population (Local Economy); Chapter 11: Water (water quality); Chapter 12: Air (construction dust and noise, operational noise and EMF); and Chapter 15: Material Assets (road users); Appendix 15.4: Stage 1 Road Safety Audit & Review; Appendix 15.1 Traffic & Transportation Assessment Report were analysed, and it was evaluated by the Human Health topic authors that, with the exception of local economy cross-factor effects, any cross factor effects to the health of Local Residents & Community or of Transient People will be Neutral.

Summary of the Likely Impact on Local Residents & Community: The only likely impact is Increased Employment which represents a positive effect on Human Health of Local Residents & Community. The impact is evaluated as **Slight (Positive)** because 100 people will work on the construction of UWF Grid Connection. While the employment is temporary, it still represent a minor positive effect on Human Health from direct income and employment (which are key wider determinants of health), with indirect and diffuse benefits at the regional and local level. **Summary of the Likely Cumulative Impact:** The UWF Grid Connection will be constructed during the same period as Upperchurch Windfarm and the Other Elements, this will lead to greater benefits to the local economy with resultant greater positive impacts on Human Health. The cumulative impact is also evaluated as **Slight (Positive).** Should the *potential* Bunkimalta Windfarm and Castlewaller Windfarm be also built during the same period then these projects will also contribute to positive Human Health effects, although the overall significance will remain the same due to the larger study area involved**.**

Summary of the Likely Impact on Transient People: Neutral Human Health impacts during construction works primarily due to the temporary exposure to any impacts. Operational effects will also be neutral due to the transient nature of this sensitive aspect and on the basis that EMF levels will remain substantially below the guideline exposure levels set to protect public health.

Conclusion: The UWF Grid Connection will not cause significant adverse effects to Human Health.

Executive Summary of the Biodiversity

The effects of the development on biodiversity in the area is assessed with respect to terrestrial and aquatic ecosystems of the receiving environment and the terrestrial, aquatic and avian fauna present therein.

Baseline Environment: The proposed Mountphilips Substation is located on agricultural grassland, on lower lying land to the west of the Slievefelim to Silvermines upland area. Outside the Mountphilips Substation site, the proposed 110kV UGC will cross through the Slievefelim to Silvermines uplands entirely under paved roads – predominately the Regional Limerick to Thurles Road (R503), in order to connect said Mountphilips Substation to the Consented Upperchurch Windfarm Substation to the east of the uplands. Due to the location of the 110kV UGC wholly within paved roads, the immediate vicinity of the 110kV UGC is dominated by agricultural grassland and other habitats reflective of this e.g. roadside hedgerows, treelines and earth banks, with numerous dwellings, farm buildings and associated gardens, amenity grassland, hedges and lawns. The wider surrounding environment is representative of typical upland habitats, and includes lands under active management for agriculture and forestry.

Field Surveys: To establish the ecosystems and species present, various field surveys were carried out including; **Field Walking** of all the works locations; **Habitat Surveys** of all **terrestrial habitats** within a 50m buffer of work locations; **Aquatic Ecology/Fisheries Survey** of the watercourse characteristics of all UGC crossing locations; **Hen Harrier Surveys** to identify breeding behaviour, active nests, availability of nesting and foraging habitats within 2km of each identified nest location, habitat and prey item presence within 150m of the construction works boundary and winter roost presence within 3.6km. Satellite imagery was examined and ground-truthing was carried out. Up to date information from local Hen Harrier experts and the NPWS informed these surveys; **General Birds Surveys** at the Mountphilips Substation site and **Kingfisher** Habitat Suitability Surveys within 300m of twenty-six crossing locations (in tandem with **Otter Surveys**) in addition to dedicated breeding surveys; buildings were noted for potential suitability for **Breeding Barn Owls**; **Bat Surveys** were conducted. Buildings within 50m of the 110kV UGC, were appraised for their suitability for roosting bats. Mature trees with bat roost suitability within 50m of the UWF Grid Connection construction works area, were inspected from ground level and all of watercourse crossing structures (i.e. bridges and culverts) were inspected for bat activity/roosts. Bat Activity Surveys using auto-mated detectors were carried out at four locations near the Mountphilips Substation site and two locations near the consented Upperchurch Windfarm substation; **Non-Volant Mammals** present within 50m of the proposed works were surveyed; and **Amphibians and Reptiles** occurring within the study area were recorded during the course of all site walkovers for habitat, mammal and bird surveys.

Survey Results for Sensitive Aspects in the Baseline Environment: Birds, bats and other mammals, amphibians, reptiles and invertebrates are present within the receiving environment. The 110kV UGC passes through the boundary of the Slievefelim to Silvermines Mountains SPA for 8km, along the R503. The SPA is designated for the protection of Hen Harrier. The 110kV UGC overlaps the boundary of the Lower River Shannon at 6 No. locations on the public road, mainly along the Regional Road (R503). The SAC is designated for the protection of aquatic habitats, and salmonids and freshwater aquatic species. Other European Sites, including the Lower River Suir SAC and the Clare Glen SAC, along with nationally designated NHAs and pNHAs are also found within the surrounding area. 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. There are three main watercourses along the route of the 110kV UGC, all of which are within the River Shannon catchment; the Newport River (crossed at Rockvale Bridge), the Clare (Annagh) River (crossed at Tooreenbrien Bridge) and the Bilboa River (crossed at Anglesey Bridge). At these crossing locations all three watercourses are evaluated as containing good salmonid habitat, with good/high biological water quality and good ecological status. Crossing works required for the 110kV UGC at these three locations

will be in the road pavement within the bridge structures. The majority of watercourse crossings for UWF Grid Connection are characterised as minor streams and land drains, which have been subject to previous anthropogenic modification (arterial drainage, drainage maintenance, channel modification, abstractions, diversions, etc.). Aspects of the topic Biodiversity, which were deemed to be Sensitive to the development are **European Sites; National Sites; Aquatic Habitats & Species; Terrestrial Habitats; Hen Harrier; General Bird Species; Bats; Non-Volant Mammals; Amphibians & Reptiles and Marsh Fritillary** *(Other elements of the Whole UWF Project only)***.**

Project Design Measures: The UWF Grid Connection development as evaluated in the EIA Report incorporates Project Design Measures or mitigation measures to avoid, prevent or reduce negative impacts on Biodiversity. There are fifty-six project deign environmental protection measures developed to protect Biodiversity in the receiving environment and seven Best Practice Measures, developed specifically to protect surface water quality. Protection of the water quality and the existing drainage regime will be managed under a Surface Water Management Plan (SWMP), while a bespoke Invasive Species Management Plan has been developed to prevent the introduction and/or spread of invasive species. These Plans will be implemented through the Environmental Management Plan by the appointed Contractor during the construction stage of the UWF Grid Connection and 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 European Sites

The findings of the effects of the UWF Grid Connection (either alone or in combination with other projects) on European Sites are fully considered and evaluated in the Appropriate Assessment Report (NIS) for the development. In line with EIA Directive Guidance, the findings of the NIS are summarised in the EIA Report (in this case the Biodiversity Chapter).

A total of 23 European or Natura Sites were identified for screening. The results of the screening was that UWF Grid Connection has potential, via impact pathways, to cause effects to the four European Sites - the Lower River Shannon SAC; Lower River Suir SAC; Clare Glen SAC; and the Slievefelim to Silvermines Mountain SPA which is designated specifically for the Hen Harrier bird.

- 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 110kV UGC is located within the boundary of the Lower River Shannon SAC at six points along public roadways.
- No part of the UWF Grid Connection overlaps the boundary of the **Lower River Suir SAC** – the 110kV construction works are located c.12km upstream of the River Suir SAC, where the last c.1.5km of the UGC route is located in the Clodiagh (Tipperary) local surface water body (sub-basin) which exists within the Suir_SC_030 sub-catchment.
- No part of the UWF Grid Connection overlaps the boundary of the **Clare Glen SAC**. Clare Glen SAC comprises a wooded area on both banks of the Clare River approximately c.2.2km downstream of the 110kV UGC (on the R503 Thurles to Limerick Regional Road) within the Annagh (Tipperary) local surface water body.
- The Mountphilips Substation is not located within the **Slievefelim to Silvermines Mountain SPA**; however, the 110kV UGC, which is 30.5km in length, passes through the boundary of the SPA for 8km in total entirely within the R503 Thurles to Limerick Regional Road.

European Site are considered to be of **International Importance**. The UWF Grid Connection was evaluated for cumulative effects with other elements of the Whole UWF Project; as part of a Whole UWF Project effect and with Other Projects and Activities (Milestone Windfarm, Newport Town Park, Rearcross Quarry,

Curraghduff Quarry, Castlewaller Windfarm, potential Bunkimalta Windfarm, and the Activities of Forestry, Agriculture, Turf-Cutting.

The Mitigation measures (Project Design Measures, Best Practice Measures, Surface Water Management Plan, Invasive Species Management Plan, Traffic Management Plan) prepared specifically for this project have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. The Mitigation Measures are considered to be robust and proven measures which will avoid significant adverse effects to European Sites.

Summary Impacts to European Sites

In summary the findings of the NIS concludes that, 'following the examination and analysis presented, it can be concluded on a reasoned basis, that the proposed UWF Grid Connection development will not result in adverse effects on the Integrity of European Sites, in circumstances where no reasonable scientific doubt remains'.

Summary of the Likely Impact to National Sites

Bleanbeg Bog NHA, Grageen Fen and Bog NHA and Mauherslieve Bog NHA are within 15km of the UWF Grid Connection. It is evaluated that there is no potential for effects because the development will not overlap any NHA boundary; the separation distance between the development and the NHA sites; the 110kV UGC will be located within the carriageway of public roads, and therefore there is an absence of ecological connectivity; the development is located downslope of all 3 No. NHA sites, and therefore it is evaluated that there are no source pathway links for hydrological effects and no likelihood of indirect habitat effects to these NHAs.

Summary of the Likely Impact on Aquatic Habitats & Species

Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community. **The impact of the development is evaluated as Slight to Slight-moderate** for decrease in instream aquatic habitat quality; **Slight to Moderate** for riparian habitat degradation and **Slight** for Changes to flow regime, disturbance or displacement and spread of invasive species. The rationale for this evaluation is generally because instream works are only required at 3 No. locations which have all been in some way altered by the existing landuse (i.e. agriculture or public road infrastructure); these works will only be undertaken during the IFI specified period (July – September); will not be undertaken without isolation of flow within the watercourse, and the removal of fish; all the remaining watercourses will be crossed using the existing structures (bridges or culverts) and the majority of all the watercourses to be crossed have low / no fisheries value. The frequency of works is once for any culvert replacement that might be required; the duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat; the brief to temporary duration and reversibility of any effects and the implementation of water quality Project Design protection measures and Best Practice Measures; and the implementation of the Invasive Species Management Plan and adherence to best practice Biosecurity Protocols (IFI, 2010). The **cumulative impact and the Whole UWF Project cumulative impact is evaluated as Imperceptible to Moderate and No Likely Impact**. The cumulative impact of the Whole UWF Project with other projects and activities in the area, will be **Slight and No Likely Impact**.

Summary the Likely Impact on Terrestrial Habitats

Within the construction works area, the Public Road and other built surfaces accounts for 82% of the habitat concerned. Within 50m of the construction works area the dominant habitats present are improved agricultural grassland (36%); improved built land (15%), wet grassland (13%), and a mosaic of built land and amenity grassland (10.5%) which together make up 75% of all habitats present. Conifer plantation and scrub and to a much lesser extent, very small amounts of other habitat and habitat mosaics make up the remaining habitats within 50m of the construction works area. There are no Flora Protection Order (FPO) species present. There are invasive plant species present at various locations. Habitats of international conservation importance are located at four of the locations where the UGC passes though the boundary of the Lower River Shannon SAC. Habitats of National Importance in the area include the Newport River; Clare River; Bilboa River and Upland/Eroding Streams habitats which are hydrologically connected to the Lower River Shannon SAC. Habitats of Local Importance in the area include woodland; hedgerows; tree lines; scrub and small areas of Oak-birch-holly woodland; Wet heath/Wet grassland habitat mosaic and Lowland blanket bog. Due to the location of 8km of the 110kV UGC within an SPA designated for Hen Harrier, a number of habitats along the route support the structure and function of the SPA. This primarily includes foraging habitats in the open landscape (grassland, heath and bog) habitats.

Terrestrial Habitats are sensitive to direct land take, pollution, and environmental changes resulting from modification, such as increased drainage. The diversity of habitats is particularly sensitive to encroachment from invasive species. **The impact of the development is evaluated as Imperceptible** for Reduction in Terrestrial Habitats; Hedgerow Severance and Loss of High Nature Value Trees at the Mountphilips Substation Site generally because the vast majority of the construction works areas (82%) are on paved roads; the low sensitivity of the habitats for which change will occur - at Mountphilips Substation site, almost all of the land use change is on improved agricultural grassland, which has been evaluated as having lower value; at the Substation Site entrance hedgerow severance to create sightlines, will be replaced immediately with new hedgerow and semi-mature trees behind the new sightlines to avoid fragmentation effects; the very low extent of permanent hedgerow severance, with net gain due to new hedgerow planting along the new access road and no noticeable adverse contrast with baseline conditions. There is **no cumulative impact. The Whole UWF Project impact is evaluated as Not Significant to Moderate (Positive)** because of the net gain of the tree replanting and the Upperchurch Hen Harrier Scheme.

Summary the Likely Impact on Hen Harrier

Hen Harrier Study Area Extents: The extent of the Study Areas have been derived from sources such as published literature on Hen Harrier, in addition to Best Practice Guidance available within the Irish and UK Guidance, in particular Scottish Natural Heritage (SNH).

1. **Within 2km from the UWF Grid Connection construction works area boundary in all directions**, for breeding sites (*confirmed nest site or centre point of observed evidence of breeding behaviour identified during the breeding season*); territories; availability of foraging (hunting) habitats and communal winter roost sites – **in accordance with SNH Guidelines**.
2. **Within 2km of identified nests**, in relation to the availability of suitable **breeding and foraging Habitat** - **foraging habitat loss** within 2km of a Hen Harrier nest may potentially have negative effects on breeding success.
3. **Within 150m of the construction works area** boundary in all directions- in relation to **disturbance displacement to foraging Hen Harrier during the breeding season**, and effective habitat loss as a result - **150m is the most suitable Minimum Approach Distance (MAD)** indicated for likely disturbance in respect of Hen Harrier.
4. Within **150m of the construction works area boundary in all directions for prey item availability** - professional Judgement, based on the most suitable **MAD recommended** for Hen Harrier.

5 Within **50m of the construction works area boundary** in all directions for **General Habitats** - Professional Judgement and as per **Best Practice**.

In Ireland, the Hen Harrier is confined largely to heather moorland and young forestry plantations, where they nest on the ground. Hen Harrier foraging habitat preferences during the breeding season, are generally biased towards moorland, grassland mosaics and pre-thicket forest habitats which support larger numbers of prey species, their preferred being small birds such as Meadow Pipits and Skylarks and small mammals such as Bank Voles and mice. Hen Harrier are considered as 'central-place' foragers with most foraging taking place during the breeding season within a 'core range' of 2km from nests. During the breeding season females hunt closer to nest locations (typically <1km) whereas males hunt further away. In a remote tracking study in the Irish context, the concentration of Hen Harrier hunting behaviour was more than 10 times higher within 1 km of the nest than it was between 2 and 5 km from the nest. During winter, Hen Harriers gather at communal or solitary roost sites. In Ireland the majority of these roost sites are located in reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse or saltmarsh.

Context of Hen Harrier in the Slieve Felim to Silvermines uplands: The Slievefelim to Silvermines Mountain SPA as a whole covers 20,917ha and has held between seven and ten pairs of nesting Hen Harrier, and is considered one of the strongholds for Hen Harrier in the country. The SPA has a high proportion (70%) of suitable habitat. Surveys, carried out between 2016 and 2019 for the current evaluation, found that Hen Harriers nested within this SPA – no nests were recorded outside of the SPA boundary. The Mountphilips Substation is not located within the SPA; however 8km in length of the 110kV UGC passes through the SPA, entirely located within the Regional Road (R503).

Nearest Hen Harrier Nesting Sites to the development: Nests within 2km of the proposed development have been identified for this application, over a study period spanning 2017-2019 inclusive. However, a precautionary approach has been taken for completeness to include the presentation of nest data out to 3km from the development – this reflects that in certain instances the central point of observed breeding activity is often variable within a breeding season or inter-annually. For the period between 2016 and 2019, **9 No. nests were recorded within 2km, with a further 3 No. nests within 3km, and 1 No. nest at 3.2km (13 No. nests in total),** all of which were located on lands within the SPA boundary. **Four** of the seven active territories identified in 2019, **had successful nests (i.e. these were still active in July 2019** having either recently fledged young or with large chick(s) still in the nest at that time). With regard to proximity to works and therefore exposure to source impact pathways for possibly significant effects, the closest identified nest to the proposed development in any year was 0.6km away (2016), with **the closest active nest in 2019 being 0.9km away**.

No nests were recorded within 2km of the Mountphilips Substation, with the nearest nest being 4.6km from Mountphilips (in 2016).

Hen Harrier Nesting Habitat within 2km of the development: All habitats within 2km of the proposed UWF Grid Connection development (whether within the SPA or outside the SPA) were evaluated for their suitability as nesting habitat for Hen Harrier, notwithstanding whether Hen Harrier territories have been recorded within this area. 34% of the land within 2km of the development was considered to provide suitable nesting habitat for Hen Harrier, with 66% classed as unsuitable. The latter percentage includes all the lands at Mountphilips – where there is no suitable nesting habitat.

However, while there is sufficient nesting habitat to support Hen Harrier within 2km of the 110kV UGC, at closer distances to the 110kV UGC the habitats are less attractive at least to nesting Hen Harriers - within 50m of the proposed works for example, only 11.2% of all habitats are identified as suitable nesting habitat. This undoubtedly reflects the location of the 110kV UGC on primarily public road and the presence of houses and community amenities.

Hen Harrier foraging habitat within the 2km core range of identified nests: The identification of suitable foraging habitat is required to determine the likelihood of disturbance to foraging Hen Harrier, during the breeding season. The area of land suitable for foraging Hen Harrier within 2km of all nests comprise 43% of the total lands within 2km of all identified Hen Harrier nests, which is greater than the 30% of suitable foraging habitat required for an area to be attractive to Hen Harrier. Linear features comprising 255km are also present, which may offer foraging opportunities.

Hen Harrier Winter Roosting Habitat in the Study area: Suitable roosting habitats are not widely available, with only very small fragmented patches of habitat located within 2km of proposed development. No communal roost was identified within 2km of UWF Grid Connection during 2016-2018 surveys. 1 No. roost exists at 2.1km from the development, with 2 No. roosts between 3km and 3.6km. Based on desktop review, and the results of scoping and consultation with local NPWS/Hen Harrier surveyors no other roosts have been identified, within the likely zone of effect of the proposed development.

Importance of Hen Harrier: Hen Harrier is listed on Annex I of the EU Birds Directive 2009/147/EC. The breeding population of Hen Harrier is Amber listed on the most recent Birds of Conservation Concern in Ireland 2014 – 2019.

Sensitivity of Hen Harrier:

Sensitivity to Habitat Loss:

Studies have shown that most foraging takes place within 2km of the nest site, and as per SNH Guidance this is considered the core foraging range for Hen Harrier during the breeding season. The magnitude of effects is distance (to nearest nest) dependant, as both frequency of occurrence and foraging intensity descreases with distance from the nest. Of particular importance and where pathways for likely significant effects are more likely are lands which provide high quality foraging habitat within 2km of nests and on which breeding Hen Harrier (male or female birds) may be dependent during key periods of the breeding cycle such as provisioning young. Loss of suitable habitat may affect breeding success/productivity for one whole cycle, or until vegetation is re-instated both when considered alone and in combination with other possible sources of loss.

Disturbance

Hen Harriers are known to be sensitive to disturbance at the nest. An expert review of disturbance presented by Ruddock and Whitfield (2007) suggests active disturbance events during the incubation (part of breeding) period for Hen Harrier are, in the view of the majority of experts, likely to occur at <10-500m from a nest.

Whilst Foraging

There have been no specific studies examining the flight initiation distance (FID) of non-breeding Hen Harriers to human disturbance. Data collected from various other sources for disturbance effects on Falconiformes (which includes the Hen Harrier species) would conservatively suggest that foraging Hen Harriers are unlikely to be impacted by disturbance events over 150m away. As a species that disperses widely during the winter from breeding sites, Hen Harrier are less restricted to specific foraging areas (i.e. birds are not territorial) during the non-breeding season.

Sensitivity of Roosting Hen Harrier

Windfarms and associated infrastructure have not been explicitly defined as a threat or pressure on roosts within the Irish context.

Positive Sensitivity towards habitat creation or sympathetic management

Hen Harriers are positively sensitive to the creation of or sympathetic management of foraging and nesting habitat within their traditional range. Multiple studies exist where Hen Harriers have continued to nest and

forage in close proximity to operational wind energy developments where inclusive habitat 'enhancement' was provided.

Likely Impacts to Hen Harrier

The impact is evaluated as **Not Significant for Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat** due to land cover change, which will only apply at the Mountphilips Substation Site. The amount of suitable habitat loss at the Mountphilips Substation site relates to a very small area (0.05ha) of wet grassland which will permanently change to new access road. As the nearest nest is 4.6km from this suitable habitat, this habitat is considered to be sub-optimal based on distance from nest. The Not Significant significance represents a noticeable change in the character of the environment at Mountphilips, but without any significant consequences on the Annex I species Hen Harrier. The **cumulative impact is also evaluated as Not Significant**. **The impact of the Whole UWF Project will be Significant (Positive)** because the Upperchurch Hen Harrier Scheme will contribute to an overall net gain to Hen Harrier of an additional 31.8Ha of actively managed foraging habitat proximal to the SPA. The cumulative impact of the Whole UWF Project with other projects (including management plans) and activities in the area, will be **Neutral**.

The impacted is evaluated as **Not Significant for Disturbance/Displacement of foraging Hen Harrier during the breeding season** because works during the breeding season (March-August) will only take place at the Mountphilips Substation site. This means that no works will occur within 4.3km of any known nests during the breeding season and the large amount of suitable habitat (3,580ha) within the core foraging range (2km) of the Hen Harrier nests identified; the availability of suitable foraging habitat within the wider area, with 70% suitable habitat available within the SPA; in the context of existing background trends, disturbance is primarily related to visual intrusion, and Hen Harrier is likely to already be habituated to road-based and farming-based noise and visual intrusion; effects will be momentary-brief in duration; unlikely to affect any individual >150m from source, and; highly reversible once any individual moves beyond 150m. The **cumulative impact is also evaluated as Not Significant**. **The impact of the Whole UWF Project will be Not Significant.** The cumulative impact of the Whole UWF Project with other projects and activities in the area, will be **Not Significant to Slight**.

The impact is evaluated as **Not Significant for Disturbance/Displacement of foraging Hen Harrier outside of the breeding season** because birds will already be habituated to road-based noise and visual intrusion; effects will be momentary-brief in duration; unlikely to affect any individual >150m from source; and highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available. Disturbance to birds at their night-time roosts, has been excluded as no significant effects are reasonably foreseeable due to distance between UWF Grid Connection works and identified roost sites. The **cumulative impact is also evaluated as Not Significant**.

The Impact is evaluated as **Imperceptible for Reduction in Prey Item Species** because a potential reduction in prey item availability only relates to the Mountphilips Substation Site, where suitable foraging habitat comprising 0.05ha will be lost, which is evaluated as negligible in the context of the separation distance to the nearest hen harrier nest (greater than 4km). There will be no noticeable changes in the character of the environment from a prey availability perspective. The **cumulative impact is also evaluated as Imperceptible**. **The impact of the Whole UWF Project will be Moderate (Positive)** because of the positive effect on prey item species of the Upperchurch Windfarm Hen Harrier Scheme. The cumulative impact of the Whole UWF Project with other projects (including management plans) and activities in the area, will be **Neutral**.

Summary of Likely Impact on General Bird Species

The species recorded during the two breeding season surveys at the Mountphilips substation site and the April 2019 survey along the entire length of the proposed 110kV UGC route are all representative of common and widespread terrestrial breeding bird communities in Ireland, being typical of the mosaic of farmland, woodland and rural gardens found in the survey areas.

The Impact is evaluated as **Not Significant** (Meadow Pipit: Habitat Loss); **Imperceptible** (Golden Plover: Habitat Loss); **Not Significant** (Golden Plover – Disturbance/Displacement); **Imperceptible** (Kingfisher, Grey Wagtail and Dipper - Disturbance/Displacement); and **Slight Positive** (General Birds - Habitat Enhancement). This is because of the negligible loss of suitable nesting habitat and the extent of suitable foraging habitat to be affected (1.75Ha), evaluated as very low, in the context of the availability of suitable habitat in the surrounding area – for Meadow Pipit at the Mountphilips Substation Site); because no Golden Plover were recorded at the Mountphilips Substation during any ecological surveys between 2016 and 2019. Activities such as cable trenching will not contrast significantly from baseline activities such as road works or farming related works; because of the low and negligible Sensitivity and Magnitude respectively of disturbance effects; the implementation of Project Design Measures for Grey Wagtail and Dipper; the duration of any individual disturbance events will be brief and reversible once works finish, with birds expected to return; and because of the benefit to bird diversity of the planting of hedgerows, erection of nest boxes and reinstatement built into the design. The cumulative impact is evaluated in the range from **No Cumulative Impact to Imperceptible to Not Significant**. The impact of the Whole UWF Project will range from **Imperceptible to Not Significant to Slight (negative) to Slight (Positive).**

Summary of Likely Impact on Bats

The key sensitivities of bats are the **destruction or disturbance of their roosting places**, and the **modification of their commuting routes and foraging habitats**.

Destruction or disturbance of bat roosts in trees due to removal of mature trees, trimming and pruning of mature trees and hedgerows at Mountphilips Substation Site. **The Impact is evaluated as Imperceptible** because only 1 tree of moderate suitability is within the zone of effect. A number of project design measures will ensure that no bats are roosting in the tree at the time of works. The other trees near the Mountphilips Substation, 1 tree has moderation suitability and the rest have low suitability for bats. **Destruction / disturbance of bat roosts in bridges** due to trenching works for the 110kV UGC, and works to parapet walls. The 110kV UGC will cross a number of bridges and culverts, all within the existing road foundations. **The Impact is evaluated as Imperceptible because** two bat roosts could be directly or indirectly affected, both of which are of Negligible Importance; and the application of project design measures include bridge surveys (and the exclusion of bats, if required) before works over a bridge commences. **Severance of commuting routes or feeding areas** due to site clearance works particularly along the route of the new access road to Mountphilips Substation. **The Impact is evaluated as Imperceptible** because only a small extent of hedgerow will be permanently lost, and; 700m of additional hedgerow planting will more than compensate for its loss. **Disturbance or Displacement due to Lighting** which will be required for security reasons at the temporary construction compound. **The Impact is evaluated as Imperceptible** because the use of cowling will prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition and any lighting that is required would only be temporarily active, and would not be on throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration. There will be **No Cumulative Impact with Other Elements of the Whole UWF Project** due to separation distance. The cumulative effect of the **Whole Windfarm Project will range from Imperceptible to Not Significant** because of the small extent of the combined works that will affect Bats.

Summary of likely Impact on Non-Volant Mammals

Baseline surveys recorded evidence of **Otter, Badger, Fox, Deer species, Rat and Squirrel species** within the study area, however limited evidence of breeding or resting sites is present, primarily due to the placement of the majority of work locations within the public road. No active breeding or resting sites for Badger (setts) or Otter (couches and/or holts) are present within the Study Area. At the Mountphilips Substation site evidence of Badger, Squirrel, Deer and Fox were recorded. No Badger setts were recorded at the Mountphilips Substation site. Along the 110kV UGC route outside of the Mountphilips Substation site, evidence of mammals is limited to 18 mammal pathways/mammal runs, which is typical evidence of roadside usage. A total of seven burrows were recorded within 50 metres of the 110kV UGC route. Three of these burrows were inactive or infrequently used. The species using these burrows could not be confirmed due to an absence of other confirmatory evidence i.e scat, hairs, or prints, however they are considered likely to be Rabbit or Rat. No protected sites in respect of Badger and other general mammals exist within the study area. All mammals are sensitive to the direct effects from disturbance/displacement from breeding and foraging ranges as a result of habitat loss, construction noise and visual intrusion.

Otter - Disturbance/Displacement due to construction noise and visual intrusion. **The Impact is evaluated as Slight** because there is recorded Otter evidence in close proximity to three identified crossings, in particular at one location where parapet works will take place over the Lower River Shannon SAC, however; no Holts or resting places occur in close proximity, and; works will take place during daylight hours, and from the surface of the bridge only, with; very slight contrast to existing baseline conditions is expected, given the majority of works take place in an existing road subject to heavy passage of traffic, to which Otter will be habituated; the brief-temporary duration of disturbance events and any corresponding effect, with effects expected to be reversible, and; project design measures to avoid/reduce effects also in place, including at all watercourse crossing locations. **Badger – Habitat Loss** where the potential for effects is limited to the Mountphilips Substation site. While no evidence of Badger activity was recorded during the 2019 survey, suitable foraging habitats, consisting of grassland, woodland and hedgerows were recorded within 50m of the substation, considering the widespread distribution of Badger in Ireland, and the presence of suitable foraging habitat within and in close proximity to the study area, Badger are considered likely to forage in the area. The **Impact is evaluated as Not Significant** because no setts were recorded within the study area. While badgers' cross roads to access feeding areas, they generally do not forage along roads, and are particularly unlikely to forage along a road as busy as the R503; the brief duration of the works and the absence of significant habitat loss associated with the area; the extent of land use change, within the context (less than 2%) of an average territory size of 80Ha, and; very slight contrast with baseline conditions. **Badger – Disturbance and Displacement**, the **Impact is evaluated as Imperceptible** because of the absence of badger setts within 50m of the works; temporary duration of the works; completion of works during daylight hours; the majority of the works will be confined to the existing public road, with all works for the 110kV UGC carried out from paved surfaces only, and; effects are unlikely to cause noticeable changes in the character of the environment. The cumulative impact is evaluated in the range from **No Cumulative Impact to Imperceptible**. The **Cumulative Impact of the Whole UWF Project will range from Slight to Not Significant** because of the absence of activity in the cumulative area and protection measures built into the design of the projects.

Summary of the Likely Impact on Amphibians & Reptiles

Taking into account the species distribution of amphibians and reptiles in Ireland, **suitable habitat exists within the study area for Smooth Newt, Common Frog,** and **Common Lizard**. Amphibians and reptiles are sensitive to direct mortality, habitat loss, habitat fragmentation and disturbance and to the emergence of previously unrecorded diseases. **No Impacts were included for further evaluation** because suitable habitat degradation is considered to be unlikely; the extent of reduction in foraging and breeding habitat is considered negligible, in the context of availability of habitats in the immediate surrounding area. Disturbance/Displacement effects are considered to be neutral because the spatial extent, limited frequency, and brief duration of the works will be negligible and identified suitable habitats do not overlap construction works areas or activity locations. There is **No Potential for Cumulative Impacts** because the impacts from any individual element will be Neutral.

Summary of the Likely Impact on Marsh Fritillary

No suitable habitat for Marsh Fritillary was recorded on or adjacent to the lands at Mountphilips Substation site. Outside of the Substation site, the 110kV UGC is located entirely in the paved surfaces of roads which are not suitable habitat for Marsh Fritillary butterfly. During 2017 surveys for Other Elements of the Whole UWF Project, three colonies of Marsh Fritillary were recorded, with two c. 1.2km north of the 110kV UGC route and one c.1.1km south east of the works at the Consented UWF Substation at Knockcurraghbola Commons. **The impact of Habitat Loss** through excavation works for UWF Grid Connection **is therefore evaluated as No Likely Impact**. **There is No Likely cumulative impact** because there was no Marsh Fritillary habitat identified within 50m of the overlap areas with the other elements of the Whole UWF Project. The cumulative effect of the **Whole UWF Project will be Slight,** and only relates to the UWF Related Works and Upperchurch Windfarm in Shevry, the **cumulative Impact of the Whole UWF Project with peat extraction activities at Cummer Bog** is evaluated as **Moderate** because of the small overall extent and degree of Habitat loss and the likely continuance of peat extraction at the nearest known colony within the study zone.

Summary of the Overall Impact on Biodiversity

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

Relevant ecosystems within the study area of the proposed development, including terrestrial and aquatic habitats, along with their respective individual receptors scoped in for appraisal have been subject to full consideration in this chapter and the resultant conclusion is that with the implementation of the mitigation and project design as outlined herein, no residual effects remain. No significant impacts on the interaction, variety or variability within species comprising terrestrial and aquatic ecosystems or European Sites comprising parts of their ecosystem functioning are anticipated.

Executive Summary of the Land Chapter

Baseline Environment: The dominant land usage in the baseline environment is permanent agricultural grassland with a notable commercial plantation forestry component. Some small areas of low intensity farmed Natura 2000 designated land, also occurs. Public roads comprising both regional and county roads, and private access roads serving domestic houses, farms and forest, also feature in the existing land use pattern.

Survey Results for Sensitive Aspects in the Baseline Environment: Construction works areas are located on 4.8 hectares of agricultural land spread over 2 No. agricultural landholdings at the Mountphilips Substation site, with a total landholding area of c.21.1 hectares. Livestock farming, dairying and beef cattle rearing, are the main activities carried out in lands adjacent to the road network along the route of the 110kV UGC. Where there is an SPA designation farming is effectively restricted to low impact grazing. Forestry Land comprises commercial forestry plantations within the upland area.

Effects to Agricultural and Forestry Land were considered. Only Loss of Use and Connectivity of Agricultural Landholdings during construction was evaluated in-depth for likely effects. In relation to Forestry Land, the 110kV UGC will be installed within an existing private paved road which passes through a forestry landholding - no works will be carried out off this road, and therefore **no impacts will occur to Forestry Land**.

Summary of the Likely Impact to Agricultural Lands: The **agricultural lands** at the works area at Mountphilips Substation Site will be fenced off and unavailable for farming use during construction and, in the early operational stage until vegetation has re-established on reinstated land. The impact is evaluated as **Imperceptible** due to the moderate scale (23% of the project) of agricultural lands subject to works; the availability of agricultural lands in the surrounding area; the small extent of permanent effects which are limited to 2 No. of the landholdings.

Summary of the Likely Cumulative Impact: There is no interaction of **agricultural land holdings** between UWF Grid Connection and Upperchurch Windfarm/UWF Related Works and therefore there is **No Cumulative Impact**. The effect of the **Whole UWF Project** (whether the project Elements interact or not) will be **Imperceptible**.

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

Executive Summary of the Soils Chapter

Baseline Environment: Soils (i.e. superficial geology including subsoils) in the study area comprise mainly poorly draining mineral or peaty topsoil over glacial tills, sandstone tills with bedrock close to the surface along much of the 110kV UGC route along the Regional Road R503. Alluvium and fluvio-glacial sand and gravels are present along the larger watercourses such as the Newport River, Bilboa River and Clare River. The underlying bedrock in the study area comprises a mixture of sandstone, limestone and volcanic meta-sediments, with the latter being most predominant.

Survey Results for Sensitive Aspects in the Baseline Environment: Review of geological mapping of the Mountphilips Substation site and the 110kV UGC route was carried out and surveys of the site including trial pit investigations at the Mountphilips Substation site (5 No.) and the Consented UWF Substation site (1 No.), were carried out to assess soil / subsoil lithology, subsoil depth and ground conditions**.** Soils are generally shallow at the UWF Grid Connection locations with 'bedrock close to surface' mapped along much of the 110kV UGC route. There are also some 'blanket peat' soils mapped by EPA adjacent to the central part of the 110kV UGC on the R503 Regional Road, peat probes at these locations found that this regional road is predominately constructed on competent ground. Project design of the cables trench includes the use of geotextile material in any sections of trench where competent ground is not encountered, this will ensure that the 110kV UGC does not affect the structure of public roads or affect the stability of the soils below.

The UWF Grid Connection will be located on agricultural grassland at Mountphilips Substation and within road pavements for the 110kV UGC outside of the Mountphilips Site (c.84% of the development). The soils in the agricultural lands and underlying the public road pavements have been heavily altered by the existing landuse. The soils, subsoils and bedrock are largely not designated and have a low to medium geological importance.

In total, approximately 28,680m^3 of geological material will be permanently excavated and this will mainly arise from the ground works and new access road for Mountphilips Substation and the trenching/joint bays for the 110kV UGC; comprising topsoil (4,060m^3), subsoil (1,240m^3) and spoil from public road excavations (23,380m^3); 5,000m^3 of the excavated material will be permanently stored along the new access road to Mountphilips Substation as linear berms around the substation and along both sides of the new access road. The remaining excavated soils (300m^3) will be reinstated within the works area at Coole/Mountphilips. All material excavated (23,380m^3) from trench and joint bay excavations along the 110kV UGC, outside the Mountphilips Substation site, will be removed to licenced waste facilities.

The cabling works are located within the boundary of the Lower River Shannon SAC at six locations along public road carriageways only, for a total length of 1025m of trenching. Within the SAC, 760m^3 of public road spoil, comprising 90m^3 of public road bitumen material; 60m^3 of public road base layer stone and 610m^3 of subsoil, will be excavated. No Joint Bays are located within the SAC boundary.

Summary of the Likely Impact on Local Soils, Subsoils & Bedrock: Soils and geology can be sensitive to processes such as excavation and relocation, erosion, compaction and contamination. Soil is biologically active and supports complex ecosystems which are sensitive to chemical and biological changes. The impact on Soils is evaluated as **Imperceptible** for compaction, erosion and contamination by oils or cement; and **Slight** for excavation and relocation, because the soil and geology at the Mountphilips Substation and along the 110kV UGC are abundant in the area and of low to medium importance; all works will be temporary and generally transient in nature; the excavations required for the 110kV UGC works will be spread out over a large geographical area and will be relatively shallow; Mountphilips Substation site will be backfilled, and the soils surrounding new permanent hard-core areas will be fully reinstated and landscaped immediately after the works; environmental protection measures are designed into the project to prevent compaction, erosion

and contamination of soils; no batching of wet cement will take place on-site and only precast concrete structures will be used at joint bays and at watercourse crossing locations as required. **Summary of the Likely Cumulative Impact on Local Soils, Subsoils & Bedrock**: Where the UWF Grid Connection interacts with Other Elements of the Whole UWF Project the cumulative compaction, erosion or contamination by fuels/oils will be **Imperceptible** due to limited interaction at the 110kV UGC with the Other Elements of the Whole UWF Project. **Slight** cumulative excavation/relocation impact due to the large volumes of excavations required for the whole project, with **Slight to Moderate** cumulative impacts in relation to contamination by cementious products which reflects the volumes of concrete which will be required for the Consented Upperchurch Windfarm turbine foundations. Concrete control measures will be implemented as part of the Consented Upperchurch Windfarm as per planning condition.

Summary of the Likely Impact on the Lower River Shannon SAC: Soils and geology are not a qualifying feature of the Lower River Shannon SAC and the construction of the 110kV UGC will not directly affect the qualifying interests of River Shannon SAC (which are largely water based aquatic habitats / species). There will be no excavation of the river bed or banks within the boundary of the SAC, and all UWF Grid Connection works within the boundary of the SAC will take place within road pavements and over existing bridge structures. The direct impact on Soils in the Lower River Shannon SAC is evaluated as **imperceptible** because the interaction of the development with the SAC is entirely within the paved public road surface and existing bridge structures, which will provide a protective cover to the underlying subsoils; use of wet cement within the SAC will be limited to the placement of very small volumes of cement mix, in the cables trench and environmental protection measures such as the lining of trenches within the SAC with impermeable material, are designed into the project to protect soils from contamination. There is **No Potential for cumulative effects with the Other Elements** of the Whole UWF Project because only the UWF Grid Connection (110kV UGC route) overlaps the boundary of the Lower River Shannon SAC.

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

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

Executive Summary to the Air Chapter

In this EIA Report, Air relates to air quality, ambient noise and vibration and Electromagnetic Fields (EMF).

Baseline Environment: The area is predominantly rural and away from major urban areas. There is a high level of air quality in the area, as it is located away from busy, congested roads and industrial sources of air pollutants. Sources of EMF in the existing environment are limited to electric equipment in homes, businesses, farms and community facilities; existing overhead and underground electricity lines; and overhead telephone lines and signals from existing telecommunications masts. The existing noise sources are typical for such a rural/ agricultural setting, with natural and man-made noise including farm machinery and traffic on the public road network and in Newport town.

Baseline Noise Measurements: A baseline environmental noise survey was undertaken in 2017 (which included weekend and weekday periods, both day and night) close to the Mountphilips Substation site. The results show, when averaged for each of the day, evening and night time periods that the noise monitoring location can be considered an area of low background noise, during calm weather at least. Noise levels along the 110kV UGC are expected to be higher, normal levels of rural noise due to the location of the works on public roads.

Survey Results for Sensitive Aspects in the Baseline Environment: The study area for Construction Dust, Noise and Vibration is 350m from the construction works area (391 No. residences and 19 No. public places and facilities) and 50m from the main transport routes (312 No. residences and 33 No. public places and facilities); the study area for Operational Noise is 400m from Mountphilips Substation (6 No. residences); and for Operational EMF is 100m from Mountphilips Substation and 110kV UGC (none within 100m of Mountphilips Substation and 317 No. residences and 17 No. public places and facilities along the 110kV UGC).

The majority of the residential dwellings are along the local road network to the north of Newport town and along the Regional Road R503 particularly in the Lackamore area and in the vicinity of Rear Cross village. The majority of public places and facilities are located in the village of Rear Cross, with facilities also available in the nearby town of Newport, and to a lesser extent in the nearby villages of Klicommon and Upperchurch.

Transient people in the area relate to road users, including walkers and cyclists, farm and forestry works in adjacent lands, and walkers on waymarked trails in the area.

Summary of the likely Impacts to Local Residents & Community of the Development:

Dust from construction works and vehicles: The impact to Local Residents & Community is evaluated as **Slight** because background levels of pollution are very low, however the works will be of temporary duration, the impact is reversible and the works will be transitory and predominantly linear in nature.

Noise from construction works and vehicles: The Impact to Local Residents & Community is evaluated as **Moderate** because the NRA threshold limits are likely to be exceeded, at some locations; not all receptors will be impact simultaneously, with only small numbers of receptors impacted at any one time due to the progressive linear nature of the works; the relatively short exposure during normal working hours with works within 350m of a receptor typically completed within 10 days, and works within 60m of a receptor generally completed within 1 to 2 days; the temporary duration of potential exceedance of the guidelines limits (generally less than 1 week); the compliance with the guideline limits at all properties which are located farther 60m (realistic case) from works areas on the public road network; the reversibility of the effect with the completion of works; the carrying out of works during daytime hours.

Noise during operation of Mountphilips Substation: There will be **No Impact** because of separation distance to the nearest residence (385m) and therefore there will be no discernible change in the baseline conditions.

Increase in ambient EMF levels during operation of the Substation and 110kV UGC: (**local residents & community**). There are no residents or community facilities within 100m of Mountphilips Substation. There will be some increase in magnetic field levels at the 317 No. local residences and 17 No. community facilities (including 2 No. schools) which are within 100m of the 110kV UGC along the public road. The Impact of increased EMF levels due to the 110kV UGC is evaluated as **Imperceptible** because the worst case increase in levels of magnetic fields will be at local residences and community facilities within 30m of the 110kV UGC where there will be a small increase in EMF levels (4.45µT at 5m from the 110kV UGC to 0.13µT at 30m from the 110kV UGC) , these levels will rapidly reduce with distance from the cabling. All other properties, which includes the 2 local schools (Lackamore National School and Rear Cross National School) the levels of EMF will remain at a level similar to existing ambient levels. In all cases, all increases in EMF remain substantially under the ICNIRP guideline limits. A level of 4.45 µT at the very closest houses have a marginally higher significance for electronic devices, however Artificial Implanted Medical Devices s such as pacemakers, are tested to higher EMF Immunity levels to safeguard operation. A limit of 100 µT also applies to these devices. There will be no increase in electric fields due to the complete screening by both the metallic sheath surrounding the cables and by the concrete and backfill materials above the cables.

For Transient People the impact of EMF will be **Imperceptible to Slight** because the value will be 54µT directly above the 110kV UGC - which is still circa. half of the ICNIRP guideline limits of 100µT. Electric fields from the 110kV UGC will be screened by metallic sheath. The electric fields at Mountphilips Substation will be 40V/m which is less than 1/100th of the ICNIRP limit of 5000V/m. In any case transient people will only experience brief and occasional exposure.

Summary of the Likely Cumulative Impact: Where the UWF Grid Connection construction works interact with UWF Related Works and Upperchurch Windfarm particularly in the Knocknabansha / Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, the cumulative impact to Local Residents & Community will be Slight (construction Dust); and Moderate (construction Noise). The Whole UWF Project cumulative impacts range from Slight (construction Dust) to Moderate (construction Noise). Where the operational UWF Grid Connection interacts with UWF Related Works and with the *potential* Castlewaller Windfarm grid connection along the Local Road L6009-0 at Castlewaller / Carrowkeale / Derryleigh; and with the existing 110kV OHL and 220kV OHL in Mountphilips and Coole townlands, the cumulative impact will be No Impact (operational noise); Imperceptible (operational EMF local residents); Imperceptible to Slight (operational EMF transient people). The Whole UWF Project cumulative impact will be in the order of UWF Grid Connection due to the separation distance between the Other Elements of the Whole UWF Project and the potential Castlewaller Windfarm grid connection and existing 110kV and 220kV OHLs.

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

Executive Summary of the Climate Chapter

Baseline Environment:

Climate change is now recognised as the biggest threat to life on earth, and it is now urgent that we take immediate action to reduce anthropogenic emissions of greenhouse gases to limit its damaging effects.

Addressing climate change requires two types of responses: mitigation and adaptation. As part of Ireland's mitigation response, the Irish government is committed to several emissions targets, including a 20% reduction by 2020 of non-ETS emissions (i.e. agriculture, transport, residential, commercial, non-energy intensive industry, and waste) on 2005 levels; with annual binding limits set for each year over the period 2013-2020; 30% reduction of emissions by 2030 compared to 2005 levels, with a longer term policy position of at least 80% reduction of emissions by 2050 (compared to 1990 levels).

Targets have also been set for electricity from renewable sources: the National Renewable Energy Action Plan sets a target of 40% electricity generation to come from renewable sources by 2020, and the White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015 – 2030' which aims to transform Ireland to a low carbon economy, sets a target of 70% electricity generation to come from renewable sources by 2030.

The latest published figures (2019) from the EPA in relation to Ireland's mitigation response, indicate that Ireland will breach its annual obligations up to 2020 (based on projected figures). EPA also project that this breach of obligations will continue into the future from 2021 to 2030. Ireland needs to reduce its use of fossil fuels considerably and urgently in order to influence these EPA projections.

To avoid the risk of long-lasting or irreversible changes to the climate system, it is clear that we must make rapid, far-reaching and unprecedented changes across all aspects of society. The transition to clean energy is an essential part of this.

Windfarms help in achieving Ireland's targets by supplying renewable energy to the national electricity system thus reducing the harmful emission content of electricity production. For example in 2018 wind energy met 29% of Ireland's electricity demand. This set a record, for Ireland in relation to the highest % in Europe of electricity demand being supplied by on-shore wind, thus impacting Ireland's mitigation response to Climate Change in a positive way. In addition to this for the first time ever recorded, wind energy provided more electricity than gas over a full month in January 2018.

The Development: While the UWF Grid Connection development will not directly impact Climate, it will cause positive indirect impacts through enabling the supply of electricity to the National Grid that is generated from renewable sources (wind generation at Upperchurch Windfarm).

Potential effects on Climate through Change remediation: Windfarms will help in achieving Ireland's targets by supplying renewable electricity to the national electricity system and indirectly reducing the use of fossil fuels for electricity production. Increased deployment of Renewable Energy electricity generation avoids CO^2 emissions from fossil fuel generated electricity, and contributes towards meeting Irelands Climate targets.

Summary of the Significance of the indirect Impact: The UWF Grid Connection itself will not generate renewable electricity and therefore will not contribute *in itself* to Climate Change mitigation action. However, UWF Grid Connection will **indirectly cause positive effects** to climate as the purpose of UWF Grid Connection is to transport the renewable electricity produced by Upperchurch Windfarm to the National Grid. An indirect **Significant Positive Impact is evaluated** by the authors for the development because Upperchurch Windfarm will generate approximately 220million kWh of renewable energy per annum, which will avoid the emission of 106,216 tonnes of greenhouse gases per annum which would have resulted from generating the same amount of electricity by fossil fuel plant. 220 million kWh is enough to supply 52,381 houses (equivalent to 40% of the houses in Counties Tipperary and Limerick combined) with green, emission free electricity.

Cumulative Impact: According to the SEAI Energy in Ireland Report (2018), the average generating capacity factor of Irish windfarms was 28% in 2017. Based on this capacity factor, and the total generating capacity of 3,700MW, windfarms in Ireland avoid the emission of 4.38 million tonnes of CO^2 eq or 7.2% of Ireland's 2017 total national emissions. Therefore the cumulative impact of Upperchurch Windfarm in addition to **all other operational windfarms in the Irish State** will also be a **Significant Positive Impact**.

Conclusion: The UWF Grid Connection will cause indirect significant positive effects to Climate

It should be noted that this **Significant Positive Impact on Climate is the only significant impact (positive or negative) from the development**, as assessed by the topic experts in this EIA Report.

Executive Summary of the Material Assets (Built Services) Chapter

Baseline Environment: The Built Services in the area are mainly made up of underground water supply pipes, and overhead telephone and medium to high voltage electricity lines.

UWF Grid Connection will involve the connection of a new substation onto the Killonan – Nenagh 110kV overhead line (OHL) which originates in the Killonan 220kV Station and ends in the Nenagh 110kV Substation. The Killonan Station is the main bulk supply point for the Mid-West region using numerous regional networks at all voltages (110kV, 38kV and 20kV). One of these regional networks is the Killonan to Nenagh 110kV OHL.

Survey Results for Local Built Services in the Baseline Environment: A GPS survey of all existing Irish Water/Eir/ESBN Networks services within 20m of UWF Grid Connection works areas was conducted. Driven surveys of the 110kV UGC route were carried out with Irish Water Newport Regional Water Supply and Kilcommon supply Area Managers. There are Irish Water mains under all of the Regional Road 110kV route and also along the Local Roads between Irish Water wells in Carrowkeale townland and the Newport Regional Water Treatment plant in New Ross townland (L6009-0 and L2157-0). Project Design Measure PD09 to ensure protection of Irish Water assets, was developed as a result of these meetings.

Summary of the likely Impact on Local Residents & Community - Water Supply: During excavation works for cables trenches and joint bays for the 110kV UGC, existing water pipes under the road could be damaged and supply interrupted. The likely impact is evaluated as **Neutral** due to the implementation of project design environmental protection measures such as confirmatory consultations with Irish Water, Eir and ESB; review of all relevant infrastructure mapping before works; confirmatory ground surveys at service locations to be carried out ahead of works; excavations will be hand dug within 500mm of pipes; a banksman will accompany each excavator to oversee all excavation works and close contact with the local Newport Regional Supply office at Newross will be maintained by the Environmental Clerk of Works throughout the construction of the 110kV UGC. **Likely Cumulative effects will also be Neutral** due to project design measures including timing of works so that they don't coincide with Other Elements of the Whole UWF Project in the Knockmaroe/ Knockcurraghbola Crownlands area.

Summary of the Likely Impact on the Transmission System: it was evaluated that any interruptions to power supplies will be Neutral, with no potential for cumulative impacts due to the planning of supply outages on the system. While the addition of a control point on the existing Killonan – Nenagh Overhead Line will be a positive impact, it is in the context of the large extent of the national transmission system network. Other Projects (such as the consented Castlewaller Windfarm or potential Bunkimalta Windfarm) will not cause cumulative impacts as these projects are not expected to involve the construction of new substation assets on this OHL.

Conclusion: The UWF Grid Connection will not cause significant adverse effects to Material Assets (Built Services).

Executive Summary of the Material Assets: Roads Chapter

Baseline Environment: Most of the UWF Grid Connection 110kV UGC involves cabling in lightly trafficked sections of the R503 Regional Road, with less works planned for local roads which are generally rural in nature and also lightly trafficked. The R503 runs generally in an E-W orientation and links Thurles town in the east with Newport town and Limerick city to the west and is identified as Strategic Roads in the North Tipperary County Development Plan 2010 (as amended).

The public roads affected are the Regional Road R503, along with the Local Roads "L" Roads – the L2166-10, L6013-0, L2156-0, L2157-0, L6009-0, L5337-1, L2264-50, L6188-0, with the exception of the L5337-1 at Tullow Newport (L5337-1 won't be affected - construction material haul route only). All of these roads are 2-way roads, with the trafficked pavement varying in width from 3.5 to 5m, with narrow verges, and are generally bounded by low level earthen embankments or hedgerows along either side, with road surface water drained to open drains, generally running along each of the roadsides.

There are no vehicle weight restrictions in place along any of the roads affected by the works. Road Boundaries consist of a mix of hedgerows and simple mounded embankments, which are aligned beyond drainage channels that occur in most roadside verges.

Road Users include local traffic and commuters on the R503 between Limerick and Thurles. Tourists may also be present on the walking/cycling routes that interact with these roads.

Survey Results for Sensitive Aspects in the Baseline Environment: Surveys of the existing road and traffic conditions were carried out including Passing Traffic Volume Data collection (ATC Tube Counts); Buried Structures Survey; Pavement video survey and Pavement Condition Index (vPCI) survey; and Peat Probe Surveys (R503 only). A Road Safety Audit and a Traffic & Transport Impact Assessment were also conducted.

Passing Traffic Volume Data surveys demonstrated that the roads in the study area are very lightly trafficked. Traffic counts (7-day classified 'ATC Tube Counts') were carried out in January 2019 at 5 locations and in May 2019 at 6 locations, to measures vehicles over a 24-hour period and the results show that traffic volumes on the roads are very low. Traffic speeds are generally maintained well within the posted speed limits.

Buried Structure surveys established that the 63 no. watercourse crossings along the public road comprise a mix of bridges (15) and plastic/concrete/masonry culverts (48). TLI Group engineers surveyed the structures and were satisfied that the road structures above the bridges (where trenching in the bridge deck is required) were in good condition and will be capable of supporting the 110kV UGC infrastructure and the increased traffic loading associated with the construction works. No works will be required to the bridge structures themselves. At two bridges (W8 and W9) the bridges are not considered to have sufficient road depth over the bridge arch/deck to accommodate the cable ducting and therefore the cabling will cross via Horizontally Drilling (HDD) under the existing bridge and watercourse. Also, the existing road level and parapet wall heights at Rockvale Bridge (W7), Tooreenbrien Bridge (W36) and Anglesey Bridge (W53) will need to be increased to accommodate the 110kV UGC. A Road Safety Audit was carried out, by Malachy Walsh & Partners, who considered that the project will not affect road safety along the route.

Pavement condition surveys show that the pavement condition on the R503 was rated as Good; with conditions on the local "L" roads found to be 'good' to 'fair' on most local roads. Surveys of the public roads along the route, particularly where the 110kV UGC route pass through mapped peat soils in the central part of the route on sections of the Regional Road R503, found that sections of the R503 road through mapped peat soils are substantially of 'excavate and fill' construction, though not all sections of road may be built on competent ground and would be considered to be of 'floating road' construction. A total of 20 peat probe sampling was also carried out to determine the depth of peat in these areas. In general the ground on both sides of the regional

road was firm ground. The design of the 110kV UGC cables trench includes the application of floating road trench design where competent ground is not encountered, this will avoid any effects to the structural integrity of any 'floating' sections of the Regional Road R503.

Road Works affecting the Public Roads including buried structures: The 110kV is almost wholly planned for the pubic road network, with trenching and cabling required in the R503 and on some Local Roads. The construction of the 110kV UGC will involve the excavation of a trench c.1.25m deep and 0.6m wide within public road pavements. In total there will be 29.2km of cables trench within the road pavements. The construction of the Joint Bays will require the excavation of the road pavement to install pre-cast concrete chambers for the 40 No. Joint Bays along the route of the 110kV UGC on the public road. Of the 48 No. culverts, no works will be required to 35 No. of these, with the 110kV UGC installed either under or over the culverts. At the remaining 13 No. culverts, the existing masonry box culvert may need to be replaced (12 No. of which are under the R503, and 1 No. under the L-2265-50). The 110kV UGC will then be installed under the existing/replaced culvert.

Works to road verges and boundaries will only occur at Mountphilips Substation site entrance. All works outside of the Mountphilips Substation site will take place within road pavements/built surfaces.

Road works affecting Road Users: It is expected that works on the public road will last approximately 8 to 9 months on the R503 and for periods of between 1 to 3 weeks at various points on the Local Roads. There will be 4 construction works crews working on the roads at the same time, with 1 crew dedicated to construction works on the local roads, and 3 crews working at separate locations along the Regional R503 Road. There will be approximately 80m – 100m of trenching completed in a single day. At the Joint Bay locations, initial construction works will take 2 days, cable pulling works will take 3 days and cable jointing works 5 days, per Joint Bay. 31 of the 40 Joint Bays are on the Regional R503 Road.

Works will result in one-lane closures on the Regional R503 Road and will result in some road closures and one-lane closures on the Local Roads. The Local Roads that will be closed for periods between 1 week and 1 month are; the two local roads north of Newport and one local road near the consented Upperchurch Windfarm substation. There are diversion options adding 5 minutes to the journey time, available around the Newport local road closures and a diversion adding 10 minutes to the journey time around the local road closure near the Upperchurch Windfarm substation. At the one-lane closure locations, traffic flow at these locations will be managed around the works, using a stop-go system and flagmen to minimise delays and disruption to road users.

A Traffic Management Plan (TMP) will implemented, the objective of which will be to control and minimise the traffic impacts of construction insofar as it may affect the road network, local residents and the travelling public on the public roads close to and adjacent to the UWF Grid Connection construction site, through measures to maximise road safety while keeping traffic flowing as freely as possible. As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the Promoter will fund the costs of Tipperary County Council engaging a chartered Civil Engineer to oversee quality control and compliance with drawings, specifications and road opening conditions for the duration of the works

Summary of the Likely Impact to Public Roads: **The impact on public road pavements is evaluated as Moderate**, due to the moderate magnitude of the works but works will be temporary; traffic on the roads is light and the road will be reinstated in accordance with the Department of Transport, Tourism & Sport Guidelines for Managing Openings in Public Roads (April 2017). **The impact on bridges and culverts is evaluated as Neutral** because the majority of buried structures require no works and also any works required will contribute to safer roads and improved infrastructure because any culverts replaced, will be replaced with higher specification culverts. **The impact to roadside boundaries is evaluated as Imperceptible** because boundary removal is limited to the widening of the existing field entrance for the Mountphilips Substation site and the reinstatement of the road boundary behind sightlines at the widened entrance. **Cumulative impacts** with UWF Related Works,

Upperchurch Windfarm and *potential* Castlewaller Windfarm (grid connection works on the local road in Castlewaller) are the same, ranging from **Neutral to Imperceptible to Moderate**.

Summary of the Likely Impacts to Road Users: The effect of delays to be expected by Road Users due to road works, is evaluated as Slight due to the lightly trafficked nature and extent of available capacity on all roads; the availability of acceptable diversions around road closures; the maintenance of local access to properties on the roads, including the roads subject to closures; the temporary duration and the application of traffic management measures and use of flagmen to minimise traffic delays. **The Cumulative Impact** with UWF Related Works, Upperchurch Windfarm and *potential* Castlewaller Windfarm (grid connection works on the local road in Castlewaller) are the same, ranging from **Imperceptible to Slight**.

Conclusion: The UWF Grid Connection will not cause significant adverse effects to Material Assets (Roads).

Executive Summary of the Cultural Heritage Chapter

Baseline Environment: The Slievefelim to Silvermine Mountain uplands area, is a region with a rich and diverse history of human settlement going back to prehistoric times, which is reflected in the archaeological record. The cultural heritage assessment focuses on cultural heritage sites within the geographical study areas – i.e. within construction works areas (and in some cases, within 500m of construction works areas); and within 2km of the Mountphilips Substation.

Survey Results for Sensitive Aspects in the Baseline Environment: The full development area was examined through a review of the Sites and Monuments Record, topographical files of the National Museum of Ireland, published and unpublished sources, cartographic analysis, reviews of historical and aerial mapping and thorough field walking. A full list and description of the Sites recorded/identified within the UWF Grid Connection Study Areas is included in Appendix 16.1: Detailed Description of Cultural Heritage Sites. An Architectural Heritage Impact Assessment for Anglesey Bridge was also carried out, see Appendix 16.2 Architectural Heritage Impact Assessment of Anglesey Bridge NIAH 22403905.

Recorded Legally Protected Sites relate to heritage sites recorded on the Record of Monuments & Places – i.e. RMP sites. In total there are 39 No. Recorded Legally Protected Sites within the 500m UWF Grid Connection Study Area and a total of 14 No. sites within 2km of Mountphilips Substation.

Other Recorded Sites relate to heritage sites recorded on the National Inventory of Architectural Heritage or on the NIAH Garden Survey. In total, 12 No. Other Recorded sites were recorded - 8 No. within the 500m UWF Grid Connection study areas and 8 No. sites within 2km of Mountphilips substation. Seven Sites are identified on the National Inventory of Architectural Heritage (NIAH) and five are demesnes listed on the NIAH Garden Survey.

Previously Unrecorded Sites are sites identified on historic Ordnance Survey Maps and/or recorded during field walking or from reviews of aerial photography. A total of 51 No. sites were recorded within the UWF Grid Connection Study Area. These sites mainly comprised of Lime Kilns, Wells, Quarries and Townland Boundaries, some of which may not have ever had any structural elements associated with them or are no longer standing.

Unrecorded Subsurface Sites relates to structures or artefacts which are currently undiscovered but which may potentially exist under the ground surface.

Summary of the Significance of the Impacts to Recorded Legally Protected Sites: 39 No. sites are within 500m of UWF Grid Connection construction works areas. No Recorded Legally Protected Sites are likely to be affected by construction works due to the distance of these sites from the construction works areas, which are located outside the Zone of Notification for all but 3 No. sites. However, **no destruction impacts** are any expected to these 3 no. sites due to the location of the 110kV UGC in public road pavements. In any case, project design measures include the archaeological monitoring of groundworks and excavations within 500m of RMP sites. In relation to the Operational Stage, 4 No. sites (of the 14 No.) within 2km of the operational Mountphilips Substation will have *theoretical* visibility of the new Mountphilips Substation, however due to the low lying location, there will be **no visual impact** as the substation will be completely screened from view from all of these 4 No. sites. **Cumulative effects with Other Elements** of the Whole UWF Project are not likely during construction, and have no potential to occur during the operational stage. Overall, the **whole project effect** will be **Imperceptible**.

Summary of the Significance of the Impacts to Other Recorded Sites: 8 No. Other Recorded Sites are within 500m of UWF Grid Connection construction works areas. In relation to the Operational Stage, there is 1 No. site within 2km of the operational Mountphilips Substation which will have *theoretical* visibility of the new Mountphilips Substation. There is **no potential for complete or partial destruction** of Other Recorded Sites from groundworks for the development, due to separation distance (6 of the 8 No. of the sites); and due to the fact

that Mountphilips Demense site has no extant features and has been subsumed into the modern agricultural landscape in the area; and due to no interaction with the columns or supporting structures of Anglesey Bridge. There is **no potential for visual impact** from Mountphilips Substation as the only Site which would have visibility of the new substation is the Mountphilips Demense, which as stated above, has no extant features and has been subsumed into the modern agricultural landscape**.** There is **No potential for cumulative impacts** due to the absence of Other Recorded Sites in proximity to Other Elements of the Whole UWF Project**.**

Summary Impact on Previously Unrecorded Sites: Due to the location of the 110kV UGC on paved roads outside the Mountphilips Substation site, the separation distance to Previously Unrecorded Sites and the monitoring of groundworks within 500m of an RMP or NIAH site, the potential for damage to Previously Unrecorded Sites is limited to townland boundaries at the Mountphilips Substation site where a 160m section of the Coole/Freagh townland boundary will be removed to facilitate the widening of the entrance from the public road and a 10m section of the Mountphilips/Coole townland boundary will be removed for the new permanent access road to the Substation compound. This impact is evaluated as **Imperceptible**, mainly due to the small extent of change to these boundaries. **Visual impacts are not likely to occur**, as none of the 22 No. Previously Unrecorded Sites which occur within 2km of Mountphilips Substation, will have visibility of the Substation. There is **no potential for cumulative impacts** due to the separation distance to Other Elements of the Whole UWF Project**.** Overall the **whole project effect** is evaluated as **Slight.**

Summary Impact on Unrecorded Subsurface Sites: By their nature, the magnitude of the impact of the development on Unrecorded Subsurface Sites cannot be determined at this stage. It is possible that unknown archaeological materials could be impacted upon by the UWF Grid Connection works, particularly at the Mountphilips Substation site where works will take place to remove sections of townland boundaries and where groundworks occur in the Other Recorded Site *GR3 Mount Philips Demesne*, and along the Regional Road R503 where 110kV UGC works will occur within the Zone of Notification for Recorded Legally Protected Sites; *GL18 – Ringfort (rath)* in Derryleigh, *GL28 – Enclosure* in Scraggeen and *GL34 – Mine (copper)* in Lackamore. It is considered that Unrecorded Subsurface Sites exposed during the course of construction ground works are most likely to involve levelled earthworks, backfilled cuts, and areas of large scale burning or artefact scatters. It is unlikely that any fully intact remains of special archaeological significance will be uncovered. The potential for impacts is mitigated by the provision for archaeological monitoring of all ground works relating to the construction, within 500m of an RMP or NIAH site, and the location of works taking place in extensively improved lands at Mountphilips, and within road pavement outside the Mountphilips Substation site. It is evaluated that UWF Grid Connection may cause **Slight Impacts** to Unrecorded Subsurface Sites. Furthermore, it is considered that there is **no potential for cumulative effects**, as any Unrecorded Subsurface Sites if present, will only be affected by initial groundworks. Overall the **whole project effect** is in the order of UWF Grid Connection – i.e. **Slight.**

<u>Conclusion: The UWF Grid Connection will not cause significant adverse effects to Cultural Heritage</u>.

Executive Summary of the Landscape Chapter

Baseline Environment: The Landscape Character of the area is one of a rolling lowland rural landscape of fields and hedgerows at its western end in the vicinity of Newport, transitioning into a more extensively managed upland rural landscape of forestry and farmland within the Slievefelim to Silvermine Mountains, throughout the central and eastern extents. In recent years the strongest trend in the wider upland areas in the south and southeast of the Slievefelim to Silvermine Mountain upland area is the emergence of wind energy developments on upper slopes and ridges along with the ancillary development of roads and electrical infrastructure.

The Visual Amenity of the area includes two designated scenic routes one of which (V12) coincides with the 110kV UGC on the R503, between Newport and the L2264-50 junction, in Knockmaroe. The main amenity and heritage assets are way-marked walking and cycle trails- the Slieve Felim Way and the Ormond Way cycle route. The various trails, particularly in the upland area provide a recreational amenity for local residents, as well as a tourism amenity. Views in the uplands take in typical rural scenes of undulating farmland and forestry and occasional peaks of higher mountains passing through the Silvermines range. Views of the gently rolling lowland landscape of fields and hedgerows at the western end of the UWF Grid Connection have a something of a traditional 'pastoral' aesthetic and tend to be relatively contained by landform and vegetation.

In a general sense, the prevailing rural landscape character in these areas is sensitive to permanent changes to landscape patterns and features, which contribute to that character. It is also sensitive to the introduction of new and unfamiliar development, particularly that which includes intensive built development and activity of a typically non-rural nature

Survey Results for Sensitive Aspects in the Baseline Environment: The only permanent above ground feature of the development on the landscape will be Mountphilips Substation. The area was photographed and Zones of Theoretical Visibility within 2km of Mountphilips Substation and Photomontages of Mountphilips as it will appear from a Local Road in Coole townland were prepared.

Summary of the Significance of Impacts to Landscape Character: The impact on Landscape Character is evaluated as **Imperceptible** for alteration of land cover because of the typical and abundant nature of the affected land cover elements with excavations for the 110kV UGC taking place almost wholly within the public road; **Slight to Imperceptible** for construction activity causing a reduction in rural tranquillity, because of the small extent and visual containment of Mountphilips Substation and the small scale, transient nature of the 110kV UGC trenching works; the temporary duration of construction activities and; the works will not contravene the objectives of the Tipperary County Development Plan Landscape Character Areas; and **Slight to Imperceptible** for intensification of built development because the above ground structures associated with the development are essentially limited to Mountphilips Substation, which will have a minor, but permanent impact on the rural landscape fabric of its site and immediate surrounds. However, it is not readily visible from surrounding roads and residences, which limits the perceived impacts on landscape character and the development will not contravene the objectives of the Tipperary County Development Plan Landscape Character Areas. **The cumulative impact** of UWF Grid Connection with Other Elements of the Whole UWF Project and with Other Projects and Activities will be **Not Significant** mainly due to the temporary transient nature of construction works, and the separation distance and absence of inter-visibility between Mountphilips Substation and Other Elements of the Whole UWF Project and Other Projects.

Summary of the Significance of Impacts to Visual Amenity: it was evaluated that Intensification of activity during construction causing visual disharmony will be **Imperceptible to Slight** because of the degree of visual containment of the Mountphilips Substation site and the temporary and transient duration of construction activities along the public road network; and **Imperceptible** for the addition of new features or loss of existing features causing visual disharmony in the operation stage because of the high level of screening around Mountphilips Substation; the barely discernible permanent surface expression of the 110kV UGC; combined with

the medium sensitivity of visual receptors within the study area. **The cumulative impact** of UWF Grid Connection with Other Elements of the Whole UWF Project and with Other Projects and Activities will be **Not Significant** mainly due to the temporary transient nature of construction works, and the separation distance and absence of inter-visibility between Mountphilips Substation and Other Elements of the Whole UWF Project and Other Projects.

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

Executive Summary of the Interaction of the Foregoing Chapter

Interaction between the Environmental Factors relates to cross-factor effects. A cross factor effect occurs when the effect on one Environmental Factor causes an indirect effect on another Environmental Factor.

In Chapters 6 to 17, the potential for likely direct and indirect effects was evaluated. Cross-factor effects are indirect effects. Potential cross factor effects were identified during EIAR Team meetings and evaluated by the authors of the receiving environmental factor topic chapter.

In summary there are no effects on one Environmental Factor likely to cause significant indirect effects on another Environmental Factor.

Executive Summary of the Mitigation Measures & Monitoring Arrangements Chapter

Mitigation Measures are environmental protection measures incorporated into the design of the project to avoid, prevent or reduce significant effects on the receiving environment. The UWF Grid Connection project includes a suite of environmental protection measures – Project Design Measures (Mitigation Measures), Management Plans and Best Practice Measures. Monitoring arrangements will involve an Environmental Clerk of Works team, monitoring the implementation of these environmental protection measures.

These measures form the Environmental Commitments in the Environmental Management Plan (EMP). The Environmental Commitments will be updated post consent with any additional requirements of planning conditions or statutory bodies. The EMP comprises Volume D of this EIA Report.

Mitigation Measures: The design of UWF Grid Connection includes 69 No. Project Design Environmental Protection Measures which are mitigation measures incorporated into the design of the project. The project also includes an Environmental Management Plan which sets out the additional measures to be implemented through a site specific Traffic Management Plan, Surface Water Management Plan, Waste Management Plan, Invasive Species Management Plan and Best Practice Measures.

Monitoring Measures: Monitoring measures are included throughout the EIA Report and additional monitoring measures are also proposed as part of the Environmental Management Plan (EMP). A Schedule of these Monitoring Measures has been collated and is included in the EMP as Tab 9: Environmental Surveying & Monitoring.

As most potential for adverse effects to the environment arises during the construction stage of the UWF Grid Connection, monitoring arrangements concentrate on this stage of the development.

Implementation of the EMP: An Environmental Clerk of Works, who will be independent of the Construction Contractor, will be employed during the construction and early operational stages and sufficient resources will be provided (including engaging extra environmental managers and specialist environmental and engineering consultants) to monitor, audit and report on the compliance of construction works with the EMP, including all of the Environmental Commitments.

The EMP includes contingency measures for unforeseen events. The Environmental Clerk of Works will have a 'stop-works' authority to temporarily stop works over part of the site to avoid either an infringement of the Environmental Commitments or an unforeseen adverse environmental event. Works will not be allowed to re-commence until the issue is resolved.

The implementation of the Environmental Commitments in the EMP will be the responsibility of the Project Manager and a contractual obligation on the Construction Site Manager during the construction stage.

During operation, monitoring and auditing of the compliance of UWF Grid Connection with the EMP will be the responsibility of ESB Networks in relation to UWF Grid Connection, and will be the responsibility of the Project Promoter for Upperchurch Windfarm in relation to monitoring and measures for Upperchurch Windfarm maintenance and operation.

Topic
Executive Summaries

UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 1: Introduction

ECOPOWER

October 2019

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

List of Appendices

Appendix No.	Appendix Title
There are no appendices associated with this topic chapter.	

Glossary of Terms

Term	Definition
EIA Directive	European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU)
Environmental Factors	The factors in the environment required to be identified, described and assessed during the EIA process. These are specified in Article 3 (1) of the EIA Directive as Population and Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets; Cultural Heritage and Landscape.
Competent Authority	The body legally delegated to decide on the Planning Application
Competent Expert	Experts who are qualified and competent in their field of expertise
Consented Windfarm	Upperchurch Windfarm – 22 wind turbines, substation, windfarm roads and ancillary works, consented in August 2014 under Planning Reference: Tipperary County Council 13/51/0003, ABP PL 22.243040
Element	One of the 5 No. elements listed in 'Whole UWF Project' below.
Project Design Environmental Protection Measures	Measures for environmental protection, incorporated into the design of the project.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Whole UWF Project	Whole project made up of 5 No. elements – Element 1: UWF Grid Connection; and the Other Elements - Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF) and Element 5: UWF Other Activities.

List of Abbreviations

Abbreviation	Full Term
ABP	An Bord Pleanála
EDL	Ecopower Developments Limited
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
GC	Grid Connection
kV	kilovolt
OA	Other Activities
OHL	Overhead Line
OSI	Ordnance Survey Ireland
RF	Replacement Forestry
RFI	Response to Further Information
RW	Related Works
UWF	Upperchurch Windfarm
UGC	Underground Cables

Executive Summary

The current subject application is for a grid connection for the already consented Upperchurch Windfarm.

The subject application for the UWF Grid Connection is being made directly to An Bord Pleanála under Section 182A (9) of the Planning and Development (Strategic Infrastructure) Act (2006). This is the 2nd Application for UWF Grid Connection. The previous application was refused by An Bord Pleanála on 17/12/2018 (ABP-301959-18). This 2nd Application takes account of the Reasons for Refusal and the ABP Inspector's Report on the Application.

This Application is technically comparable to the previous application, with the main exception that the 110kV UGC has changed from a generally cross country route in the previous application to a wholly road route in this Application, the Mountphilips Substation is also slightly larger and with a different layout than the previous application in 2018.

The UWF Grid Connection proposal comprises of the following elements

- Mountphilips Substation
- Mountphilips – Upperchurch 110kV Underground Cable (110kV UGC) and,
- Ancillary Works at Mountphilips Substation site.

The purpose of UWF Grid Connection is to export electricity, from Upperchurch Windfarm when it is constructed and operational, to the national grid. The 110kV UGC will connect the Consented UWF Substation at Upperchurch Windfarm to the now proposed substation at Mountphilips, and the new Mountphilips Substation will be connected to the existing, adjacent Killonan - Nenagh 110kV overhead line. The export of electricity from Upperchurch Windfarm will be via the new Mountphilips Substation.

The subject application is part of a whole project which also comprises the following other elements – UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities. These are collectively referred to as the Whole UWF Project in this EIA Report, and are included in the cumulative evaluations within this Report.

1 INTRODUCTION

1.1 Introduction to the Applicant

Ecopower Developments Limited (EDL) is part of the Ecopower group of specialist on-shore wind energy development, operation & maintenance and asset management companies, and has been involved in wind energy developments in Ireland since 1996.

1.2 Introduction to the EIA Report

This Environmental Impact Assessment Report (EIA Report or EIAR[1]) has been prepared to accompany the subject application by Ecopower Developments Limited to An Bord Pleanála for the grid connection element of the already consented Upperchurch Windfarm. The subject application, Upperchurch Windfarm Grid Connection, is called the UWF Grid Connection throughout this report[2].

UWF Grid Connection comprises the following elements:

- A new 110kV electrical substation at Mountphilips townland (to be called Mountphilips Substation)
- A new 110kV underground electrical cable connecting the Mountphilips Substation to the consented Upperchurch Windfarm substation (to be called Mountphilips – Upperchurch 110kV UGC or 110kV UGC).

Relevant Volume C3 EIAR Figures:

Figure GC 1.1: Location of UWF Grid Connection on OSI Discovery Mapping (The Subject Development)

1.3 Application under Strategic Infrastructure

The subject application for the UWF Grid Connection is being made directly to An Bord Pleanála under Section 182A (9) of the Planning and Development (Strategic Infrastructure) Act (2006).

EDL commenced pre-application consultation for this Application with An Bord Pleanála (under Section 37B of the Planning and Development Act 2000 (as amended)) on 7th January, 2019. At the conclusion of the process, on the 12 June 2019, An Bord Pleanála determined that the UWF Grid Connection Application is strategic infrastructure and therefore should to be lodged directly with An Bord Pleanála.

Relevant Volume C4 EIAR Appendices:

[1] Environmental Impact Assessment Report prepared in accordance with Directive 2011/92/EU (as amended by 2014/52/EU).

[2] The already consented Upperchurch Windfarm is called the 'Upperchurch Windfarm', the abbreviation 'UWF' is used to describe the Other Elements of the Whole Upperchurch Windfarm Project, i.e. UWF Grid Connection etc.

Appendix 3.1: Consultation with An Bord Pleanála *This appendix contains the full record of consultation between Ecopower and An Bord Pleanála between January 2019 and the Determination dated 12th June, 2019 (Page 25 of the pdf).*

1.4 Previous Application for UWF Grid Connection

This is the 2nd Application for UWF Grid Connection (2019 Application). The previous application (2018 Application) was refused by An Bord Pleanála by Order dated 17/12/2018 (ABP-301959-18). This 2019 Application takes account of the Reasons for Refusal and the ABP Inspector's Report on the 2018 Application (dated 27th November 2018).

The Reasons for Refusal of the 2018 Application and the Inspector's Report are examined in Chapter 4: Alternatives Considered of this Main EIA Report. The Inspectors Report is available at http://www.pleanala.ie/casenum/301959.htm

The 2018 Application for a 'substation and associated works and an 110kV underground grid connection' was also deemed to be strategic infrastructure and therefore the application was made directly to An Bord Pleanála. Consultation Reference 22.VC0098.

1.4.1 Changes to the development from the 2018 Application

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 entrance 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 Site 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. This is to reflect new layout requirements in Eirgrid Specifications for a loop substation (such as Mountphilips Substation). ***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: Changes in this 2019 Application from the 2018 Application.

1.5 Structure of the Planning Application

This planning application comprises a suite of application particulars, which include this EIA Report and accompanying Figures and Appendices; Planning Documents; Planning Drawings; Appropriate Assessment Reporting and an Environmental Management Plan for the UWF Grid Connection project. Reference Documents for the Other Elements of the Whole UWF Project are also provided to facilitate the evaluation of cumulative impacts. The documents are presented in separate volumes.

Table 1.1 below, summarises the contents of these volumes so that it is clear, to the reader, where information can be found.

Table 1.1: Documents accompanying the planning application

Volume No.	Document Title	
Volume A	Planning Application Documents – Application Form; Site/Newspaper Notice; Letters of Consent; Schedule of Submitted Documents etc.	
Volume B	Planning Drawings	
Volume C	UWF Grid Connection EIA Report	Volume C1: EIAR Non-Technical Summary Volume C2: EIAR Main Report Volume C3: EIAR Figures Volume C4: EIAR Appendices
Volume D	UWF Grid Connection Environmental Management Plan	
Volume E	Appropriate Assessment Reporting and Appendices	
Volume F	Reference Documents for Other Elements of the Whole UWF Project	2018 UWF Related Works EIA Report 2018 UWF Related Works Environmental Management Plan 2018 UWF Replacement Forestry EIA Report 2013 EIS for Upperchurch Windfarm 2013 RFI for Upperchurch Windfarm 2014 ABP Inspector's Report for Upperchurch Windfarm 2014 Grant of Permission & Conditions for Upperchurch Windfarm
Volume C4: EIAR Appendices:		UWF Other Activities: Appendix 5.6 Description of UWF Other Activities

1.6 Description of UWF Grid Connection

The UWF Grid Connection proposal comprises of the following elements

- Mountphilips Substation
- Mountphilips – Upperchurch 110kV Underground Cable (110kV UGC) and,
- Ancillary Works at Mountphilips Substation site.

1.6.1 Purpose of UWF Grid Connection

Upperchurch Windfarm (UWF) is consented but not yet constructed - Planning Reference: Tipperary County Council 13/51/0003; ABP PL 22.243040. Upperchurch Windfarm was granted planning permission in August 2014. The windfarm comprises 22 No. wind turbines, an electrical substation and ancillary works. The windfarm substation (Consented UWF Substation) is located in Knockcurraghbola Commons, generally in the centre of the windfarm.

The purpose of UWF Grid Connection is to connect the Consented UWF Substation at Upperchurch Windfarm to the now proposed substation at Mountphilips. The Mountphilips substation will in turn, be connected to the existing, adjacent Killonan - Nenagh 110kV overhead line and thereby export electricity, from Upperchurch Windfarm when constructed and operational, to the national grid.

1.6.2 Location and overview description of UWF Grid Connection

Mountphilips Substation: The new substation is proposed for a location adjacent to the existing Killonan - Nenagh 110kV overhead line in agricultural grassland in Mountphilips townland, 2km north of Newport, 4km south of Birdhill, 17km north east of Limerick City and 23km west of the Upperchurch Windfarm.

The new 110kV electrical substation will comprise a compound, measuring 10290m^2 in area, which will contain a control building; 110kV busbars; circuit breakers; line disconnects; current and voltage measuring equipment; cable chairs; surge arresters; lightening protection monopoles and other electrical apparatus. The compound will be surrounded by a secure palisade fence. The substation compound will be located c.130m east of the Killonan – Nenagh 110kV overhead line, at its closest point. The new substation will also comprise 2 No. End Masts which will be constructed under the Killonan – Nenagh 110kV overhead line, these End Masts will be connected to the overhead line and will also connect to the electrical equipment in the compound via underground cable.

Mountphilips - Upperchurch 110kV UGC: The 110kV UGC will connect Mountphilips Substation to the Consented UWF Substation at the consented Upperchurch Windfarm, through the installation of underground cables. The 110kV UGC is 30.5km in length, and is **mostly located along the Regional Road R503 (Limerick to Thurles Road).** The route follows the Local Road network from the entrance off the public road for Mountphilips Substation at Coole, to a point on the eastern outskirts of Newport Town at Newport GAA Club, thus avoiding Newport Town. From that point, the route follows the R503 eastwards for 22.1km as far as the turn-off at Knockmaroe townland, onto Local Road L2264-50 (Borrisoleigh Road). Then along the local road network, and then along a private paved road to the Consented UWF Substation in Knockcurraghbola Commons.

This route west to east is through the townlands of Mountphilips, Coole, Freagh, Foildarrig, Oakhampton, Rockvale, Mackney (O'Brien), Mackney (Bourke), Ahane, Newross, Castlewaller, Carrowkeale, Tullow, Cooldrisla, Derryleigh, Kilnacappagh, Scraggeen, Derrygareen, Inchadrinagh, Knockancullenagh, Fanit, Lackamore, Tooreenbrien Upper, Tooreenbrien Lower, Reardnogy Beg, Reardnogy More, Shanballyedmond, Baurnadomeeny, Coonmore, Foildarragh, Kilcommon, Loughbrack, Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons.

The 110kV UGC will be installed in trenches, which will be laid with ducts through which the electrical cables and communications cables will be pulled. The cable lengths will be pulled through and joined together in joint bay chambers at 38 No. Joint Bay locations. The ducts will be surrounded by concrete and the trench backfilled with aggregate. Outside the Mountphilips Substation site the top of the trench will be reinstated with road surfacing material according to Local Authority specifications. The only surface expression of the 110kV UGC will be the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates.

Ancillary Works at Mountphilips Substation site will support the construction of UWF Grid Connection and will include the construction and use of a Temporary Compound at Mountphilips; construction of a new Permanent Entrance at Coole townland (including the provision of sightlines at an existing farm entrance) and the construction of a Permanent Access Road from the new entrance to the proposed substation at Mountphilips townland; ancillary works will also include replacement of watercourse crossing structures; installation of drainage systems at Mountphilips Substation, around the Temporary Compound and along the new Access Road; fencing; provision of electricity supply to Mountphilips substation; excavation and reinstatement and disposal of spoil; hedgerow/tree removal at Mountphilips and hedgerow replanting and site reinstatement.

Relevant Volume C3 EIAR Figures:

Figure GC 1.1: Location of the UWF Grid Connection on OSI Discovery Mapping (The Subject Development)

Relevant Volume B: Planning Drawings

DWG. No. 05654-200 Overall Site Layout Plan

1.7 Cumulative Evaluation of UWF Grid Connection

The subject application (UWF Grid Connection) is part of a whole project which comprises the following other elements – UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities. These are collectively referred to as the Whole Upperchurch Windfarm Project, called the 'Whole UWF Project' in this EIA Report (EIAR). The cumulative impact of the Whole UWF Project is evaluated in this EIAR.

The purpose of the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities elements is to facilitate the construction and operation of the already consented Upperchurch Windfarm (UWF). Upperchurch Windfarm when operational, will produce renewable electricity from the wind to supply the National Grid.

Table 1.2: Element 1 of the Whole UWF Project

Element No.	The Subject Development	Composition of the Subject Development	Planning Status and Competent Authority for the Subject Development
1	The Subject Development: UWF Grid Connection (GC)	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Ancillary Works at Mountphilips Substation site	Current planning application to An Bord Pleanála

Table 1.3: Element 2 to 5 of the Whole UWF Project

Element No.	Element of the whole UWF project	Composition of each Element	Planning Status and Competent Authority for each Element
2	UWF Related Works (RW)	Internal Windfarm Cabling Realigned Windfarm Roads Haul Route Works Telecom Relay Pole RW Ancillary Works	1st Party Appeal to An Bord Pleanála. Lodged on 6th February, 2019. ABP Ref. 303634-19. Tipperary County Council Ref. No. 18/600913.
3	UWF Replacement Forestry (RF)	Replacement Forestry at Foilnaman	Afforestation license granted by the Minister for Agriculture, Food and the Marine on 07/11/2018. Forest Owner Number FO138819C. Contract Number CN81893.
4	Upperchurch Windfarm (UWF)	Consented UWF Turbines Consented UWF Substation Consented UWF Roads UWF Ancillary Works	Already consented under Planning Reference: Tipperary Co.Co. 13/51/0003, ABP PL 22.243040
5	UWF Other Activities (OA)	Haul Route Activities Upperchurch Hen Harrier Scheme Monitoring Activities Overhead Line Activities	No planning permission required – no works or interventions into the natural environmental.

An Environmental Impact Statement was prepared for Upperchurch Windfarm to accompany the 2013 planning application, with Further Information also submitted during 2013. An EIA Report was also prepared to accompany the planning/licence applications to the relevant Competent Authorities, for the UWF Related Works and UWF Replacement Forestry. These EIS/EIA Reports can be found in Volume F: Reference Documents for Other Elements of the Whole UWF Project.

Relevant Volume C3 EIAR Figures

The location of each element of the whole UWF project is illustrated on:

Figure CE 1.1: Location of the UWF Grid Connection and the Other Elements of the Whole UWF Project on OSI Discovery Mapping.

1.7.1 Cumulative Locational Context of all the Elements

The majority of the Whole UWF Project is located in County Tipperary with some minor activities along the Upperchurch Windfarm turbine component haul route and on the Killonan to Nenagh 110kV overhead line, in County Limerick (these activities are part of Element 5: UWF Other Activities).

The UWF Grid Connection is adjacent to and overlaps with Other Elements of the Whole UWF Project and in particular;

- It overlaps with Upperchurch Windfarm at the Consented UWF Substation**;**
- It is adjacent to the UWF Related Works and the Upperchurch Windfarm in Knocknabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands

Relevant Volume C3 EIAR Figures:

Figure CE 1.2: UWF Grid Connection and the Other Elements of the Whole UWF Project in the vicinity of Upperchurch Windfarm.

Figure CE 1.3: UWF Grid Connection and the Other Elements of the Whole UWF Project in Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands.

UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 2: The EIAR Process including Scoping

ECOPOWER

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Figure CE 2.1	Other Projects or Activities Scoped In for Cumulative Evaluation in the Environmental Factor topic chapters

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

List of Appendices

Appendix No.	Appendix Title
Appendix 2.1	Scoping of Other Projects or Activities for Cumulative Evaluations

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

Glossary of Terms

Term	Definition
Environmental Factors	The factors in the environment required to be identified, described and assessed during the EIA process. These are specified in Article 3 (1) of the EIA Directive as Population and Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets; Cultural Heritage and Landscape.
Competent Authority	The body legally delegated to decide on the Planning Application
Competent Expert	Experts who are qualified and competent in their field of expertise
Consented Windfarm	Upperchurch Windfarm – 22 wind turbines, substation, windfarm roads and ancillary works, consented in August 2014 under Planning Reference: Tipperary County Council 13/51/0003, ABP PL 22.243040
Element	One of the 5 No. elements listed in 'Whole UWF Project' below.
Project Design Environmental Protection Measures	Mitigation Measures for environmental protection, incorporated into the design of the project.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Whole UWF Project	Whole project made up of 5 No. elements – Element 1: UWF Grid Connection; and the Other Elements - Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm and Element 5: UWF Other Activities.

List of Abbreviations

Abbreviation	Full Term
EDL	Ecopower Developments Limited
EIAR	Environmental Impact Assessment Report
UWF	Upperchurch Windfarm
UGC	Underground Cables

Executive Summary

Legislative Context

These application documents have been prepared in compliance with the requirements of the EIA Directive, meaning European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment.

The EIA Report

In the EIA Report, the following environmental factors or topics are examined by competent experts - **Population; Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets (Built Services); Material Assets (Roads); Cultural Heritage and Landscape**. These chapters describe the Baseline Characteristics of the Environment; Baseline Information sources; Evaluation methodology, Scoping and identification of Sensitive Aspects; Evaluation of each Sensitive Aspect which includes a description of the baseline environment, the relevant Project Design Environmental Protection Measures; an evaluation of the effects of UWF Grid Connection directly, indirectly and cumulatively with off-site projects (Other Elements of the Whole UWF Project) and other projects and activities; an evaluation of the whole project effects; Mitigation Measures for any significant effects, and Evaluation of Residual Impact; followed by a summary table with the predicted impacts for each Sensitive Receptor. An **Executive Summary (technical summary), including Sensitive Receptors; Summary Baseline and Summary Impact evaluation and values, is presented at the start of each chapter.**

Where available topic specific industry guidance and best practice has been used. Where there are no specific guidelines on evaluating the baseline environment and assessing the effects of the proposal on a specific environmental topic, the methodology used is a standardised EU methodology – the IMPERIA methodology. The terms used to describe effects are per EPA definitions from 'EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports' (draft August 2017).

Presentation of the EIA Report

Accessibility, legibility and clarity were the key considerations when organizing the layout of the EIA Report Chapters. In this EIAR Main Report (Volume C2), the information in the Environmental Factor topic Chapters 6 to 17, is prepared by different **competent experts** but presented in the chapters using a **standardised structure** with a **pre-defined layout, terms and definitions; standard evaluation processes (including scoping) and standard descriptive methods and impact descriptions** in order to ensure that all likely and significant effects are clearly communicated, placed in context and easily cross-referenced.

- So that the information for the cumulative evaluation is clearly distinguishable from the information on the actual development being applied for, all cumulative information sections are highlighted in grey.
- **Mapping and Illustrations, including maps, plans, sections and diagrams** are presented in a **separate volume** – **Volume C3: EIAR Figures** so that they can be prepared at a scale that is legible and so that they do not distract from the flow of the text. Volume B comprises the technical Planning Drawings.
- **Appendices** have been used for including detailed or supplementary information and photographs that are not core to the EIA Report but which nonetheless provide a more detailed understanding, or technical scrutiny of important issues. These are contained in a **separate volume – Volume C4 EIAR Appendices**.
- A Technical **Executive Summary** is presented at the start of each chapter.
- A **Non-Technical Summary** is presented in a handy, short separate volume with figures included – **Volume C1: Non-Technical Summary**.

2 THE EIA REPORT PROCESS INCLUDING SCOPING

2.1 Legislative Context of EIA

2.1.1 The EIA Directive

The Environmental Impact Assessment (EIA) of projects is governed by the terms of European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU (The Directive or The EIA Directive) on the assessment of the effects of certain public and private projects on the environment. The EIA Directive requires that public and private Projects that are likely to have significant effects on the environment be made subject to an assessment prior to development consent being given. These application documents have been prepared in compliance with the EIA Directive and fulfil all the requirements of an Environmental Impact Assessment Report under the Directive.

The EIA Directive Article 1: Paragraph 2(a) defines 'project' as

- The execution of construction works or of other installations or schemes and
- Other interventions in the natural surroundings and landscape including those involving the extraction of mineral resources.

The EIA Directive divides potential Projects into two lists;

- Annex I – where EIA is required in all cases.
- Annex II – where Member States shall determine whether an EIA is required.

UWF Grid Connection as a Project is not an Annex I or Annex II type project.

2.1.2 Screening for the requirement for EIA

UWF Grid Connection is part of a whole project – Whole Upperchurch Windfarm Project, which includes a Project described in Annex II: Paragraph 3. Energy Industry (i) Installations for the harnessing of wind power for energy production (wind farms).

Under Irish planning law, Part X (Ten): Environmental Impact Assessment of the Planning and Development Act 2000 (as amended) sets out the requirements under the Act, for environmental impact assessment on Projects of a Class listed in Part 2: Schedule 5 of the Planning and Development Regulations 2001 (as amended). Schedule 5: Paragraph 3 (i) lists 'Installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5 megawatts'.

Therefore screening was carried out to establish if an Environmental Impact Assessment (EIA) was required to be carried out by the consenting authority (the Competent Authority) on the subject development – UWF Grid Connection – because it is part of a whole project containing a windfarm which required EIA.

2.1.2.1 Result of Screening for EIA

UWF Grid Connection is part of the Whole UWF Project, one element of which, Upperchurch Windfarm, did require that the competent authority carry out an environmental impact assessment. In order that a cumulative assessment of the Whole UWF Project, including the subject development UWF Grid Connection, be carried out at this stage by the competent authority, an EIA Report has been prepared.

2.2 The EIA Report

An environmental impact assessment thus screened in, the promotor (EDL) is obliged to prepare an environmental impact assessment report (EIA Report).

2.2.1 EIA Report Requirements under EIA Directive

The information to be provided in the EIA Report, is set out in Article 5 and also in Annex IIA and Annex IV of the EIA Directive. This EIA Report was compiled having regard to the generality of the EIA Directive and specifically to the requirements of Article 5; Annex IIA and Annex IV.

2.2.2 Guidance Documents for the EIA Report

This EIA Report has been prepared in accordance with the following Guidance Documents:

- **Directive 2011/92/EU (as amended by 2014/52/EU)**: Article 5, Annex IIA and Annex IV (www.ec.europa.eu/environment/eia/pdf/EIA_Directive_informal.pdf)
- **Transposition of 2014 EIA Directive** (2014/52/EU) in the Land Use Planning and EPA Licensing Systems (Department of Housing, Planning, Community and Local Government, 2 May 2017). (www.housing.gov.ie/sites/default/files/publications/files/key_issues_in_transposition_of_2014_eia_directive_-_stakeholder_consultation_document_02may2017.pdf)
- **Guidance on the preparation of the EIA Report** (European Commission, 2017) (www.ec.europa.eu/environment/eia/eia-support.htm)
- **Guidance on Screening** (European Commission, 2017) (www.ec.europa.eu/environment/eia/eia-support.htm)
- **Guidance on Scoping** (European Commission, 2017) (www.ec.europa.eu/environment/eia/eia-support.htm)
- **Guidelines for the Assessment of Indirect and Cumulative Impacts** as well as Impact Interactions, (European Commission, 1999). (www.ec.europa.eu/environment/eia/eia-support.htm)
- **Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports** (EIAR) (EPA 2017) (www.epa.ie/pubs/advice/licensee/drafteiarguidelines.html)
- **Guidelines on the information to be contained in Environmental Impact Statements** (EPA 2002); (www.epa.ie/pubs/advice/ea/guidelines)
- **Advice Notes on Current Practice in the preparation of Environmental Impact Statements** (EPA 2003). Both at (www.epa.ie/pubs/advice/ea/guidelines)
- **Planning and Development Act** 2000 (as amended) – Part X Environmental Impact Assessment
- **Planning and Development Regulations** (as amended) – Part 10 Environmental Impact Assessment
- **Chapter 3:** The Scoping Consultations.

2.2.3 The EIA Report Coordinators

An EIA Report Co-ordinator was appointed, who arranged for all the initial consultations, site investigations, development designs and technical investigation to be carried out; appointed engineering and scientific experts as 'The Project Design Team' to prepare the final project design; assembled the EIA Report Team of experts (which includes the project design team members) to prepare the specialist environmental factors or topic chapters for the EIA Report on the chosen design; co-ordinated communication across the members of the Project Design team and the EIA Report Team; co-ordinated the assembly and presentation of the EIA Report and carried out continuous reviews of the Report. Julie Brett of EDL is the EIA Report Co-ordinator for the UWF Grid Connection project.

2.2.4 The Project Design Team

In order to anticipate and avoid adverse effects on the environment, EDL engaged specialist engineering and environmental consultants for planning and design of UWF Grid Connection. The specialists considered the technical requirements according to ESB specifications and also alternative locations, technologies, layouts, processes and design mitigation measures. These specialists are competent experts[1] in their field of expertise and, are identified in Table 2.1 below.

Table 2-1: The Project Design Team

Team Member	Competence	Design Area
Ecopower Developments (EDL)	Windfarm planning and development specialists EIA practitioners	Supervision of overall design Alternatives Considered Project Design Environmental Protection Measures development. EIAR Co-ordinators
ESB Networks (ESBN)	Electrical Engineers	Review of the location, designs and processes for the main elements of the Mountphilips Substation and 110kV UGC
Highfield Energy	Electrical Engineers	High level electrical design and overview of the Mountphilips substation, including alternative locations for Mountphilips Substation
Transmission Links Ireland (TLI)	Utility Infrastructure Consultancy	Design of the Mountphilips 110kV Substation Design of the Mountphilips – Upperchurch 110kV Underground Grid Cable (110kV UGC) including alternative layouts and designs. Project Design Environmental Protection Measures development – Roads, Road Users and Built Services
INIS Environmental	Environmental Consultants specialising in ecology & environmental management	Alternatives Considered in relation to Biodiversity Project Design Environmental Protection Measures development for Biodiversity
Hydro Environmental Services (HES)	Environmental engineers and hydrogeologists	Alternatives Considered in relation to Soils and Water Project Design Environmental Protection Measures development for Soils and Water
Kilkenny Archaeology	Archaeologists	Alternatives Considered in relation to Cultural Heritage
James Powell	Conservation Archaeologist	Construction Methodology for parapet works on Anglesey Bridge NIAH Project Design Environmental Protection Measures development for Anglesey Bridge

2.2.5 The EIA Report Team

Including the Project Design Team, EDL engaged the services of additional suitably qualified and experienced Competent Experts to appraise the likely effects on all the Environmental Factors, of the UWF Grid Connection development as proposed, and to put forward additional Project Design Environmental

[1] Competent Experts: Article 5(3) Directive 2014/52/EU

Protection Measures and Additional Mitigation Measures (if required). The competency of these experts is summarised in Table 2-2 below.

Table 2-2: The EIAR Team (Chapters and Appendices)

EIAR Chapter	Competent Expert
EIA Report Co-ordinator Chapters 1-5, 18, 19 Executive Summary Non-technical Summary	Julie Brett Lead Assessor (Dip. EIA) Philomena Kenealy (Dip. EIA) Project Managers in EIA and AA Reporting; leaders of a multi-disciplinary team which have completed site investigations, assessments and planning applications on 20 windfarm projects on-shore in Ireland.
Chapter 6: Population	John Lawler, (M. Econ. Sc. Hons), Ciara Morley (Ph.D. Finance) EY-DKM Economic Advisory Services (EY-DKM)
Chapter 7: Human Health	Tara Barratt (MSc Environmental Technology), Dr Andrew Buroni (PhD International Health and Impact Assessment methods and best practice) RPS
Chapter 8: Biodiversity	Howard Williams BSc CEnv MCIEEM CBiol MRSB MIFM; Chris Cullen Dip. Eng. Dip. Ecol. ACIEEM; Dr. Alex Copland BSc PhD; Jennifer Pearson BA MSc ACIEEM; Donncha Ó Catháin BSc (Hons) MSc GCIEEM; Peter O Connor MSc. QCIEEM; Gyr Penn Bird Surveyor; Timothy Gallagher Ecologist/ Mammologist - Inis Environmental Consultants
Chapter 9: Land	Andy Dunne (B.Agr.Sc M.Sc(Agr)) Environmental Agricultural Engineering Consultancy (EAEC)
Chapter 10: Soils	David Broderick (BSc, H. Dip Env Eng, MSc): Hydrogeologist; Michael Gill (P. Geo., B.A., B.A.I., M.Sc., Dip. Geol, MIEI): Environmental Engineer and Hydrogeologist of Hydro-Environmental Services (HES)
Chapter 11: Water	As per Soils above
Chapter 12: Air	Air Quality - Ciara Nolan BSc (Hons) in Energy Systems Engineering and Master in Applied Environmental Science of AWN Consultancy Noise & Vibration - Peter Barry (BAgr Sc.MSc) Electromagnetic Fields - John McAuley MSc (Hons) in Engineering; Lewis Brien (B (Hons) in Electronics of CEI (Compliance Engineering Ireland)
Chapter 13: Climate	Ciara Nolan BSc (Hons) in Energy Systems Engineering and Master in Applied Environmental Science of AWN Consultancy
Chapter 14: Material Assets (Built Services)	Electricity Network: Ruairí Geary and David Tarrant, Chartered Engineers; Daithí Barrett - Lead Environmental Scientist, with Transmission Links Ireland (TLI Group) Communication Network: Kevin Hayes Master of Electronic Engineering Software Design Engineer, aI Bridges. Water Supply Network: David Broderick Hydrogeologist, HES; David Tarrant, Chartered Engineers, TLI Group
Chapter 15: Material Assets (Roads)	Ruairí Geary and David Tarrant, Chartered Engineers; TLI Group
Chapter 16: Cultural Heritage	Cóilín Ó Drisceoil (MA MIAI) and Barry Fitzgibbon (MA MIAI) Kilkenny Archaeology
Chapter 17: Landscape	Richard Barker MLArch Landscape Architecture. Macro Works Consultancy
Chapter 18: Interaction of the Foregoing	Julie Brett, EIA Coordinator, (Dip.EIA)

2.2.6 Cumulative Evaluation

2.2.6.1 Cumulative Evaluation Requirements

Under the EIA Directive, the totality of a project must be considered which includes off-site projects and other projects and other activities.

2.2.6.2 What are Cumulative Impacts?

Cumulative impacts are the addition of many neutral or significant effects, including effects of other projects, to create larger, more significant effects.

While a single activity may itself result in a neutral impact, it may, when combined with other impacts (neutral or significant), result in a cumulative impact that is collectively significant. For example, effects on water quality due to construction activity may be neutral for the subject development, however it may be necessary to assess the cumulative impacts taking account of construction activities for other off-site, secondary or other projects or activities.

2.2.6.3 Cumulative Projects

Off-Site Projects are integral to the primary project, i.e. they are required for the primary project to operate.

UWF Grid Connection is part of a whole project which comprises the following elements – Element 1: UWF Grid Connection, Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF) and Element 5: UWF Other Activities. Elements 2, 3, 4 and 5 are off-site projects relevant to the Subject Development – UWF Grid Connection.

Secondary projects are projects that may arise largely because of the existence of the principal project, though they are usually not carried out by the promoter of the principal project.

There are no known Secondary projects, which may arise because of the existence of UWF Grid Connection, therefore no secondary projects are scoped in for consideration of cumulative impacts.

Other Projects or Activities are existing, consented or proposed projects (which are no related/connected to the subject development) located in the area which by addition could create larger, more significant effects. A total of 10 No. other projects and 3 No. activities have been scoped in for consideration in the EIAR, as described in Section 2.3.3.

2.3 Scoping for Content and Extent of the EIA Report

According to 'EC 2017 Guidance on Scoping', scoping is the process of determining the content and extent of the information to be submitted to the Competent Authority to ensure that the environmental assessment is focused on the project's most significant effects on the environmental factors. Scoping was carried out throughout the whole EIA Report preparation process for UWF Grid Connection.

2.3.1 Key Activities in the preparation of the EIA Report

The key activities involved in the preparation of this EIA Report included:

- A preliminary description of the proposed development was prepared by EDL
- Scoping by competent experts and consultation with environmental authorities and local and regional authorities, other interested parties and the public, to define the EIA Report content.
- Scoping following the results of consultation to finalise the particulars of the development, identify potentially significant effects on environmental factors and consider alternative options to those particulars.
- The final particulars thus established, a description of the final proposed development was prepared by EDL which included the final proposed characteristics of the Project including the Environmental Protection Measures designed into the Project; the life-cycle stages including construction and operation phases; the use of natural resources including Land, Biodiversity, Water and Soils; and expected residues, emissions, and waste from the Project. The particulars of related projects and other projects and activities are described.
- This is followed by the 12 No. topic specific chapters (Chapters 6 – 17) covering Population; Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets (Built Services); Material Assets (Roads); Cultural Heritage and Landscape. These were prepared by topic specific experts. These chapters describe the Baseline Characteristics of the Environment; Baseline Information sources; Evaluation methodology, Scoping and identification of Sensitive Aspects; the potential for interaction with other Factors was considered; Evaluation of each Sensitive Aspect consisting of a description of the baseline environment, the relevant Project Design Environmental Protection Measures; and evaluation of effects (including direct, indirect, and cross-factor effects) on individual Sensitive Receptors directly from the UWF Grid Connection and in combination with off-site projects, secondary projects and other projects and activities; an evaluation of the effects of the Whole UWF Project; any mitigation measures for significant effects and the evaluation of Residual Impact, followed by a summary table with all predicted impacts for each Sensitive Receptor. An Executive Summary (technical summary), including Sensitive Receptors; Summary Baseline and Summary Impact evaluation and values, completes each chapter.
- The Interaction of the Foregoing (Chapter 18) was then finalised.
- Chapter 19 – A schedule of Mitigation Measures is presented. Monitoring Arrangements for the project was prepared by the EIA Co-Ordinator, based on the survey and monitoring requirements which form part of project design or best practice measures.
- A Non-Technical summary of the information contained in the EIA Report was prepared, by the EIA Co-ordinator.
- The EIA Report was reviewed, by the EIA Co-ordinator, for compliance with the Directive and completeness of the EIA Report.

2.3.2 Scoping for Receptors and Effects

Scoping to identify the likely receptors of significant impacts from the Project was carried on through all iterations of the Project from initial design; through to alternatives; inclusion of environmental protection measures in the project design and finally during examination of the final design of the Project.

The scoping process considered topic specific publications; legislation or regulatory controls relevant to the project; information from the Competent Authority and the Local Authority and from Statuary Bodies and NGOs and other parties who were likely to have either or both, thematically specific or area specific concerns; Landowner and Community feedback; competent expert fieldwork and desktop studies and Design Team walkover surveys on site.

The Scoping process followed the same pattern irrespective of Project design stage;

- **Identification of a Study Area:** The receiving environment relevant for each topic was scoped using a combination of industry guidance and competent expert's knowledge and expertise, to delineate a study area boundary where effects could arise.
- **Scoping to identify Receptors:** All Receptors within this Study Area likely to be affected by the project were identified using a combination of field surveys; desktop surveys of information mapping including designated sites information and mapping; industry guidance on protection standards for the environmental topics and the competent expert's knowledge and expertise.
- **Scoping to identify Impact Pathways:** The Conceptual Site Model technique was used by the Competent Experts to identify likely source-pathway-receptor links to these Receptors (see Table 2.3 below).
- **Receptors which are likely to be affected** were then examined for magnitude of impact. If impacts are likely to occur then the Receptor was included as a Sensitive Receptor, for evaluation for significance of effects, in the topic chapter.
- **Discussions were held with the EIA Coordinator** wherein it was decided in which topic chapters certain Sensitive Aspects or Impacts Pathways would be evaluated, and cross-factor effects were considered.

The terms used in this EIA Report to describe impacts/ source/ pathway/ receptor are defined in Table 2-3.

Table 2-3: Definition of Terms – Source, Pathway, Receptor (EPA, August 2017)

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

2.3.2.1 Scoping out of effects

During all stages of EIAR preparation, the competent experts also scoped out (excluded) potential effects to Receptors. This was because either:

a) there will be no potential for effect, or

b) the effect is not likely to take place, or

c) the effect will be Neutral

Note: EPA define 'Neutral' as 'No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error'. In this EIA Report, the terms 'less than imperceptible' and 'no measurable effect' have the same meaning as 'Neutral'.

2.3.3 Scoping for Cumulative Effects

There are three cumulative studies in this EIA Report

- A cumulative evaluation of the UWF Grid Connection in-combination with any of the other Elements of the Whole UWF Project or with any relevant Other Projects & Activities
- A cumulative evaluation of the Whole UWF Project (whether the Other Elements interact or not)
- A cumulative evaluation of the Whole UWF Project with any relevant Other Projects and Activities.

2.3.3.1.1 Cumulative Evaluation of UWF Grid Connection with the Whole UWF Project Elements

All of the other Elements of the Whole UWF Project are scoped in (included) for cumulative evaluation in the Environmental Factor topic chapters, and are included in the initial cumulative scoping for each Sensitive Aspect.

The competent expert's evaluations start from certain basic assumptions for the other elements:

- The evaluation is based on the description of UWF Related Works; UWF Replacement Forestry; and UWF Other Activities Elements provided in this EIAR Chapter 5: Description of the Development: Section 5.6.1 and Appendix 5.3; 5.4 and 5.6.
- The evaluation of the cumulative effects of the consented Upperchurch Windfarm is based on the 2014 An Bord Pleanála Inspectors Report, the 2013 windfarm planning application EIS; the 2013 Reply to Further Information and additional information submitted. It is assumed that the Upperchurch Windfarm will be constructed incorporating all mitigation measures and planning conditions imposed by the Board's 2014 Order to Grant Permission. **Note**: The topic specific competent experts did not carry out a new evaluation of the Upperchurch Windfarm, rather they relied on the effects of the Upperchurch Windfarm (with all mitigation measures) as have been already established and deemed acceptable, by An Bord Pleanála. Impact information and impact significance is drawn from the Board's assessment, from the reasons and considerations and planning conditions as set out in the Board's Order and from the EIS, Reply to Further Information and additional information submitted during the planning process in 2013/2014. A compiled description of Upperchurch Windfarm is provided in this EIAR Chapter 5: Description of the Development: Section 5.6.1 and Appendix 5.5.

2.3.3.1.2 Additional matters taken into consideration during cumulative evaluations

- The effect of the passage of time since the Board's 2014 assessment on the baseline environment of Upperchurch Windfarm is also considered, and presented in the Cumulative (baseline) Information for each Sensitive Aspect in each of the Environmental Factor topic chapters;
- Impacts which were assessed for Upperchurch Windfarm were automatically included for evaluation in relation to UWF Grid Connection;
- In the event of any new impact pathway being identified during the course of UWF Grid Connection evaluations, then this new impact pathway was examined for Upperchurch Windfarm and the Other Elements also, so that the cumulative whole project impact with UWF Grid Connection could be determined for this new impact.

2.3.3.1.3 Cumulative effects with Other Projects and Activities

A 15km area around the footprint of all Elements of the Whole UWF Project was drawn, and research of other large projects within this area was carried out. This research, carried out by Construction Information Services (CIS), one of Ireland's leading research companies, and by the EIA Coordinators Ecopower Developments, covered the period from January 2011 to May 2018. To cover all projects which may have received planning (and an additional extension of duration) in the intervening period, to October 2019, a further search was conducted by the EIA Coordinators Ecopower Developments. In addition to this, the

EIAR Team's knowledge of the area added existing projects such as existing windfarms, to the list. Activities in the area surrounding the works were also considered.

The following changes from the previous application for UWF Grid connection (2018), are relevant to this 2019 application:

- The Newport Distributer Road was excluded as planning permission has expired on this project;
- Newport Town Park was included as this project was consented by An Bord Pleanála in April 2019;
- A planning search of plans submitted to Clare, Tipperary and Limerick county councils from May 2018 to October 2019 resulted in 7 No. projects being included for scoping for potential cumulative impacts – these comprise forestry entrances at Cappamore, CummerBeg and Knockshanbrittas, a quarry at Curraghduff, a glamping park at Lackamore, and a biorefinary facility in Moyne, near Thurles, along with the aforementioned Newport Town Park;
- Smaller developments such as agricultural developments, which were scoped in the previous 2018 application and which were found not to have potential to cause noticeable cumulative impacts mainly due to the small scale of these developments and separation from the project, have been scoped out from consideration in this 2019 EIAR.

In total, 23 No. Projects and 3 No. Activities were identified which were considered to have potential to cause cumulative effects and were scoped in relation to each Sensitive Aspect of the Environment.

This list was examined for the geographical or 'spatial' boundary and the temporal or 'time frame' boundary relevant for each environmental factor and was scoped to identify the projects likely to have a measureable cumulative effect. These projects were brought forward for cumulative evaluation in the topic specific chapters. In total, 12 No. of Other Projects and 3 No. Activities were brought forward for cumulative evaluation in the Main EIAR. These are the Other Projects or Activities identified on Figure CE 2.1, as per:

- Killonan to Nenagh 110kV Overhead Line
- Shannonbridge – Killonan 220kV Overhead Line
- Potential Bunkimalta Windfarm and Consented Grid Connection
- Consented Castlewaller Windfarm and Potential Grid Connection
- Existing Milestone Windfarm
- All operating wind turbines in the Irish State
- Existing Rear Cross Quarry
- Existing Foilnaman Mast
- Existing Cummermore Communications Pole
- Proposed Quarry at Curraghduff
- Consented Newport Town Park
- Activity – Forestry
- Activity – Agriculture
- Activity – Turf Cutting

Relevant Volume C4 EIAR Appendix

Appendix 2.1 Scoping of Other Projects & Activities for Cumulative Evaluations.

Relevant Volume C3 EIAR Figure

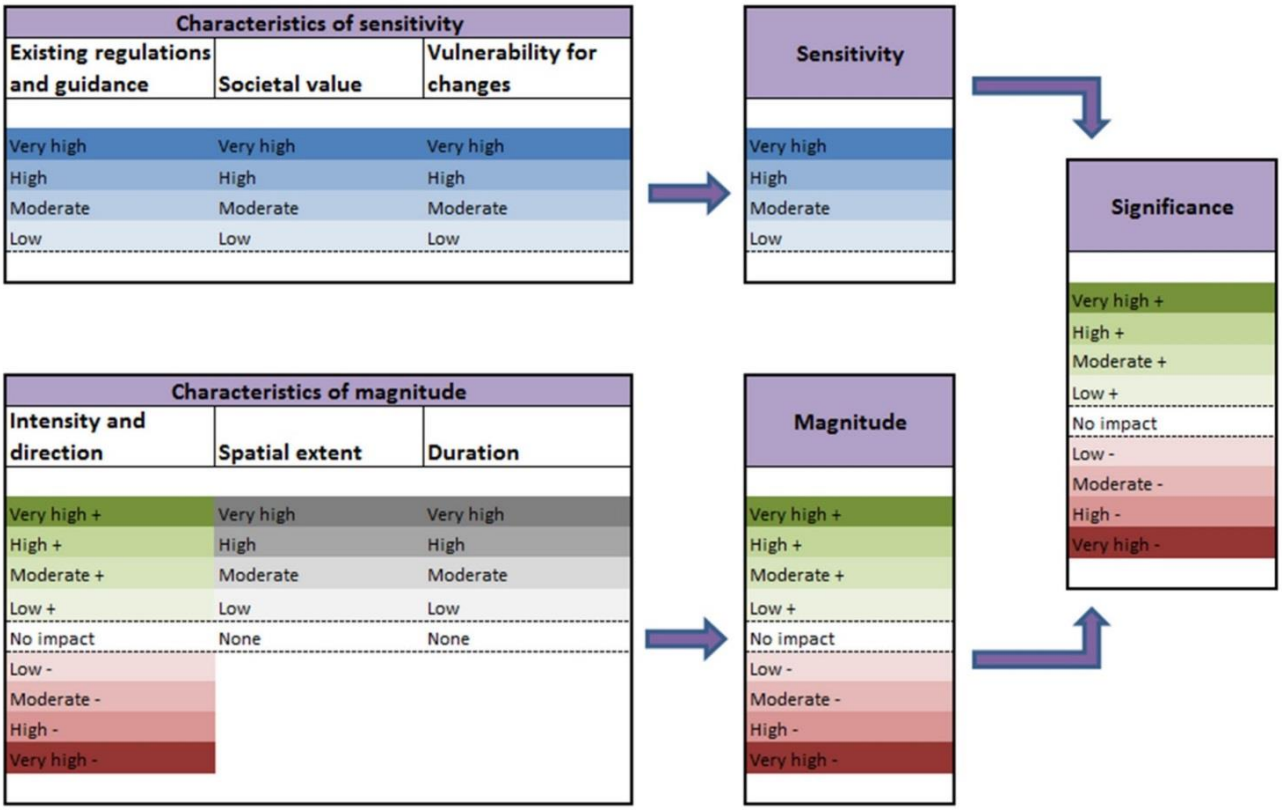
Figure CE 2.1: Other Projects or Activities Scoped In for Cumulative Evaluation in the Environmental Factor topic chapters

2.4 Methodology used to describe Baseline Environment and to Evaluate Impacts

For environmental factor topics, where there are no specific guidelines on evaluating the baseline environment and assessing the effects of a development on that factor, the methodology used in this EIA Report is a standardised EU methodology – the IMPERIA methodology[2]. The IMPERIA methodology is described below.

2.4.1 Overview of the IMPERIA Methodology

In the framework developed under the EC LIFE project - IMPERIA, the evaluation of impact significance uses a replicable, multi-criteria decision analysis, where the sensitivity of the receptor (i.e. the sensitivity of a Sensitive Aspect of the environment) and the magnitude of the change caused by a project are rated using sub-criteria or scales, and then the overall significance is evaluated using a matrix.



The criteria for determining the overall sensitivity of a receptor and magnitude of the change (impact) to the receptor, is provided in the tables below. The matrix for determining the significance of the impact to the receptor is provided after these tables.

[2] Improving Environmental Assessment by Adopting Good Practices and Tools of Multi-criteria Decision Analysis (IMPERIA 1.8.2012-31.12.2015) (LIFE 11 ENV/FI/905 https://www.jyu.fi/science/en/bioenv/research/natural-resources-and-environment/imperia-project

2.4.2 Criteria for Evaluating the Sensitivity of a Receptor

Sensitivity of the receptor is a description of the characteristics of the receptor or aspect of the environment which will be affected by the development. It is a measure of 1) existing regulations and guidance, 2) societal value and 3) vulnerability for the change. The sensitivity of a receptor is estimated in its current state prior to any change implied by the project.

Existing regulations and guidance describes whether there are any such objects in the impact area, which have some level of protection by law or other regulations (e.g. prohibition against polluting groundwater and Natura areas), or whose conservation value is increased by programs or recommendations (e.g. landscapes designated as nationally valuable).

Societal value describes the value of the receptor to the society and depending on the type of impact may be related to economic values (e.g. water supply), social values (e.g. landscape or recreation) or environmental values (e.g. natural habitat). Societal value measures general appreciation from the point of view of society. When relevant, the number of people impacted is taken into account.

Vulnerability for the change describes how liable the receptor is to be influenced or harmed by changes to its environment.

Sensitivity	Criteria Existing regulations/guidance	Criteria Societal value	Criteria Vulnerability to change
Low	Few or no recommendations which add to the conservation value of the impact area, and no regulations restricting use of the area (e.g. zoning plans).	The receptor is of small value or uniqueness. The number of people impacted is small.	Even a large external change would not have substantial impact on the status of the receptor. There are only few or none vulnerable receptors in the area.
Moderate	Regulation sets recommendations or reference values for an object in the impact area, or the project may impact an area conserved by a national or an international program.	The receptor is valuable and locally significant but not very unique. The number of people impacted is moderate.	At least moderate changes are needed to substantially change the status of the receptor. There are some vulnerable receptors in the area.
High	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas) or international contracts which may have direct impact on the feasibility of the proposed development.	The receptor is unique and valuable to society. It may be deemed nationally significant and valuable. The number of people impacted is large.	Even a small external change could substantially change the status of the receptor. There are many vulnerable receptors in the area.
Very High	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas) or international contracts which may prevent the proposed development.	The receptor is highly unique, very valuable to society and possibly irreplaceable. It may be deemed internationally significant and valuable. The number of people affected is very large.	Even a very small external change could substantially change the status of the receptor. There are very many vulnerable receptors in the area.

The **overall sensitivity of a receptor** is assessed by the competent expert on the basis on his/her assessment of the components of sensitivity. A general guide for deriving the overall sensitivity is to pick the maximum of existing regulations and guidance and societal value and then adjust that value depending on the level of vulnerability.

Determining the Overall Sensitivity of a Receptor	
Low	The receptor has minor social value, low vulnerability for the change and no existing regulations and guidance. Even a receptor which has major or moderate social value may have low sensitivity if it's not liable to be influenced by the development.
Moderate	The receptor has moderate value to society, its vulnerability for the change is moderate, regulation may set reference values or recommendations, and it may be in a conservation program. Even a receptor which has major social value may have moderate sensitivity if it has low vulnerability, and vice versa.
High	Legislation strictly conserves the receptor, or it is very valuable to society, or very liable to be harmed by the development.
Very High	Legislation strictly conserves the receptor, or it is irreplaceable to society, or extremely liable to be harmed by the development. Even minor influence by the proposed development is likely to make the development unfeasible.

2.4.3 Criteria for Evaluating the Magnitude of an Impact

Magnitude of the impact describes the characteristics of changes the planned project is likely to cause. Magnitude is a combination of 1) intensity and direction, 2) spatial extent, and 3) duration. Assessment of magnitude evaluates the likely changes affecting the receptor *without* taking into account the receptors sensitivity to those changes.

Intensity describes the physical dimension of a development. The direction of the impact/change is either positive (green) or negative (red).

Magnitude	Criteria – Intensity & Direction
Very High	The proposal has an extremely beneficial effect on nature or environmental load. A social change benefits substantially people's daily lives
High	The proposal has a large beneficial effect on nature or environmental load. A social change clearly benefits people's daily lives.
Moderate	The proposal has a clearly observable positive effect on nature or environmental load. A social change has an observable effect on people's daily lives
Low	An effect is **positive** and observable, but the change to environmental conditions or on people is small
No impact	An effect so small that it has no practical implication. Any benefit or harm is negligible.
Low	An effect is **negative** and observable, but the change to environmental conditions or on people is small
Moderate	The proposal has a clearly observable negative effect on nature or environmental load. A social change has an observable effect on people's daily lives and may impact daily routines
High	The proposal has a large detrimental effect on nature or environmental load. A social change clearly hinders people's daily lives.
Very High	The proposal has an extremely harmful effect on nature or environmental load. A social change substantially hinders people's daily lives

Spatial extent describes the geographical reach of an impact area, or the range within which an effect is observable. Duration describes the length of time during which an impact is observable and it also takes other related issues such as timing and periodicity into account. These are relevant for impacts which aren't observable all the time such as periodic impacts.

Magnitude	Criteria Spatial Extent	Criteria Duration
Low	Impact extends only to the immediate vicinity of a source. Typical range is < 1 km.	An impact whose duration is at most one year, for instance during construction and not operation. A moderate-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance
Moderate	Impact extends over one municipality. Typical range is 1-10 km	An impact lasts from one to a number of years. A long-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance
High	Impact extends over one region. Typical range is 10-100 km	An impact lasts several years. The impact area will recover after the project is decommissioned.
Very High	Impact extends over several regions and may cross national borders. Typical range is > 100 km.	An impact is permanent. The impact area won't recover even after the project is decommissioned.

2.4.4 Deriving the overall magnitude of the change from components of magnitude

Magnitude of the change is a comprehensive synthesis of its component factors. In a case, where intensity, spatial extent and duration all get the same value, the magnitude would also be given this value. In other cases, intensity is be taken as a starting point, and the assessment is then adjusted based on spatial extent and duration to obtain an overall level of magnitude. The aim is that the overall assessment captures the characteristics of an effect. The table below describes some example descriptions of different categories for the magnitude of the change.

Determining the Overall Magnitude of the Change/Effect	
Very High	The proposal has beneficial effects of very high intensity and the extent and the duration of the effects are at least high.
High	The proposal has beneficial effects of high intensity and the extent and the duration of the effects are high.
Moderate	The proposal has clearly observable positive effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
Low	An effect is positive and observable, but the change to environmental conditions or on people is small
No impact	No change is noticeable in practice. Any benefit or harm is negligible.
Low	An effect is negative and observable, but the change to environmental conditions or on people is small.
Moderate	The proposal has clearly observable negative effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
High	The proposal has harmful effects of high intensity and the extent and the duration of the effects are high
Very High	The proposal has harmful effects of very high intensity and the extent and the duration of the effects are at least high.

2.4.5 Assessing the significance of an impact

The **assessment of the overall significance uses the matrix below,** where positive impacts are in green and negative in red. The matrix is based on the **magnitude of the change** affecting a receptor and on the **sensitivity of the receptor** to those changes.

The values obtained from the table are indicative because the most relevant dimensions for characterising an impact are dependent on the type of impact. Thus, some discretion from the expert is required, in particular in cases, where the one component is low and the other one high or very high.

Determining the Overall Significance of an Impact

Impact Significance		Magnitude of change								
		Very High	**High**	**Moderate**	**Low**	**No Impact**	**Low**	**Moderate**	**High**	**Very High**
Receptor Sensitivity	**Low**	Significant*	Moderate*	Slight	Imperceptible	No Impact/ Neutral	Imperceptible	Slight	Moderate*	Significant*
	Moderate	Significant	Significant	Moderate	Slight	No Impact/ Neutral	Slight	Moderate	Significant	Significant
	High	Profound	Significant	Significant	Moderate*	No Impact/ Neutral	Moderate*	Significant	Significant	Profound
	Very High	Profound	Profound	Significant	Significant*	No Impact/ Neutral	Significant*	Significant	Profound	Profound

** Especially in these cases, significance might get a lower estimate, if sensitivity or magnitude is near the lower bound of the classification*

Note on Terms used in 'Determining the Overall Significance of an Impact' Table: *The Significance rating ascribed in the Table above have been refined from the ARVI tool, to provide a more nuanced understanding of the significance and also to be compatible with the terms used throughout this EIA Report, which have been informed by the EPA Guidelines on Information to be contained in EIAR (2017) for description of effects* – See following Section 2.5 Descriptive Terminology used in this EIA Report.

In the above Table - Low has been refined as Slight or Imperceptible depending on context; High has been renamed as Significant; Very High has been renamed as Profound and No Impact is understood to also mean Neutral effect, which is defined in the EPA Guidelines as 'no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error'

2.5 Descriptive Terminology Used in this EIA Report

Terms that have a widely accepted meaning are used consistently throughout this EIA Report. Specialised or technical terms are listed in the Glossary of Terms at the beginning of every topic chapter (Chapter 6 - 17). The terms 'effect' and 'impact'; 'appraised' 'considered' and 'evaluated' ;' indirect impact' and 'secondary impact' are used interchangeably in this EIA Report.

The terms used to describe effects are EPA definitions taken from the latest relevant guidance per;

- EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (draft August 2017);

The standard descriptive EPA terminology for Effects which is used in this EIA Report is set out below, for;

- Probability
- Significance
- Extent and Context
- Quality
- Duration and Frequency
- Type of Effects

Table 2-4: Definition of Probability of Effects

Probability of Effect	Description
Likely Impact	The effects that are specifically predicted to take place - based on an understanding of the interaction of the proposed project and the receiving environment or the effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project, if all mitigation measures are properly implemented.

Source: *EPA (draft August 2017) Guidelines on the information to be contained in EIA Reports*

Table 2-5: Definition of Quality of Effects

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

***Source**: EPA (draft August 2017) Guidelines on the information to be contained in EIA Reports*

Extent and Context: Extent refers to the 'size' or 'amount' of an impact, determined on a quantitative basis and the 'context' which refers to whether the effect is unique or, perhaps, commonly or increasingly experienced.

Table 2-6: Definition of the Extent and Context of Effects

Extent and Context	Description
Extent	The size of the area, the number of sites and the proportion of a population affected by an effect
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

***Source**: EPA (draft Sept. 2015) Revised Guidelines on the information to be contained in EIS*

Table 2-7: Definition of the Duration and Frequency of an Impact

Duration of Effect	Description
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day
Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years
Medium-term Effects	Effects lasting seven to fifteen years
Long-term Effects	Effects lasting fifteen to sixty years
Permanent Effects	Effects lasting over sixty years
Frequency of Effects	How often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

***Source**: EPA (draft August 2017) Guidelines on the information to be contained in EIA Reports*

Table 2-8: Definition of Significance of Effects

Significance of Effect	Description
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate Effect	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

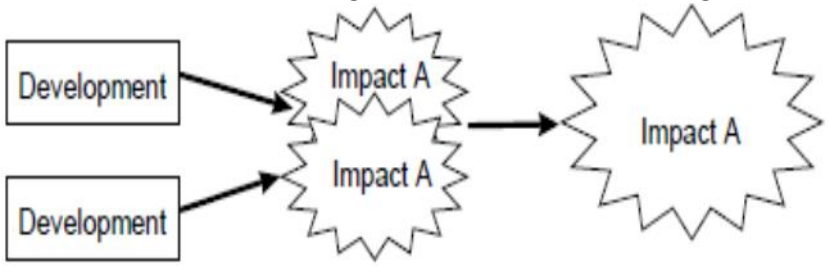
***Source:** EPA (draft August 2017) Guidelines on the information to be contained in EIA Reports*

2.5.1 Types of Effects

Direct effects are those that result from direct cause-effect consequences of interactions between the environmental factor and the Project.

Indirect and cumulative impacts and impact interactions are also considered. The definitions presented below have been used in the appraisals of the various environmental factors in the Environmental Topic Chapters 6-17.

Table 2-9: Definition of Indirect, Cumulative and Impact Interaction

Type of Effect	Description
Indirect Effects (also called Secondary Effects)	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway. 
Cumulative Effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects. 

***Source**: EPA (draft August 2017) Guidelines on the information to be contained in EIA Reports*
***Graphics from** EC (May 1999) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions: Section 2.1*

Table 2-10: Definition of Other Types of Effects

Type of Effect	Description
'Do Nothing' Effects	The environment as it would be in the future should the subject project not be carried out.
'Worst Case' Effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Reversible Effects	Effects that can be undone, for example through remediation or restoration
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SO_x and NO_x to produce smog).

***Source**: EPA (draft August 2017) Guidelines on the information to be contained in EIA Reports*

2.6 Presentation of the EIA Report

In this EIA Report the Coordinators' aim is to set out the herein environmental information in a rational and systematic format so that the EIA Directive requirements are shown to be addressed. This has been achieved through management by the lead assessor during the whole EIAR process in order to keep the focus on evaluating the likely effects on important or sensitive environmental receptors. Accessibility, legibility and clarity were the key considerations during chapter review and editing. The result is an EIA Report that is concise and well integrated across the specialist chapters.

To achieve this concise and focused style, the key presentation techniques deployed were;

- The **Non-Technical Summary is presented in a handy, short, separate volume with figures** included. Volume C1: Non-Technical Summary.
- An **Executive Summary (technical)**, including Sensitive Receptors evaluated; Summary Baseline and Summary Impact evaluation and values, is presented in Volume C2: Main EIA Report at the end of each chapter.
- In the **Main EIA Report**, the information in the Environmental Factor topic Chapters 6 – 17 is prepared by various experts but presented in the chapters using a standardised structure with a pre-defined lay-out, terms and definitions; standard evaluation processes (including scoping) and standard descriptive methods and impact descriptions in order to ensure that all likely and significant effects are clearly communicated, placed in context and easily cross-referenced.
- **The impacts are evaluated by Sensitive Aspect**;
- Every Environmental Factor chapter is set out in the following manner;
    - **Section X.1:** *('X' being the chapter number, e.g. Section 6.1 in the Population chapter):* comprises an introduction to the topic, a list of the Sensitive Aspect (receptors); overview of the development, the authors; sources of baseline information; and methodology for evaluation.
    - **Section X.2 – X.X** *(depending on how many Sensitive Aspects are Evaluated)***:** comprises an evaluation of the Sensitive Aspects including the study area; baseline characteristics including a description of cumulative projects; relevant project design measures; evaluation of impacts (Section X.X.4) including cumulative evaluations; mitigation; residual impact; application of best practice measures, and summary table.
    - **Final Section -** a technical **Executive Summary of the Topic Chapter**.
- To help readers navigate to various individual Sensitive Aspects and their descriptions/evaluations, an **individual colour code is used for each Sensitive Aspect** throughout the topic chapter. The colour-codes have been applied to section headings; tables; and on sidebars on the edge of the page.
- The impacts are evaluated for the Project as it is described in Chapter 5: Description of Development. At the conception of the Project, the design team evaluated the potential or likely significant effects of the development on the receiving environment. The potential for significant adverse effects were avoided, by integrating **Project Design Environmental Protection Measures** into the fundamental design of the development. **The development, as described in Chapter 5, is the final iteration of the project including these project design measures**. It is this final iteration that is examined in Chapters 6 to 17, for effects on the prescribed environmental factors, by the topic competent experts.
- **Appendices** have been used for including detailed or supplementary information and photographs that is not core to the EIA Report but which nonetheless provide a more detailed understanding, or technical scrutiny of significant issues. Appendices are cross referenced in the text of the EIA Report where relevant. These appendices are contained in a separate volume - Volume C4: EIAR Appendices;

- **Mapping and Illustrations,** including maps, plans, sections and diagrams are presented in a separate volume so that they can be prepared at a scale that is legible and so that they do not distract from the flow of the text. Illustrations are cross referenced in the text of the EIA Report where relevant. These illustrations are contained in a separate volume – Volume C3: EIAR Figures. Planning Drawings are presented in a separate volume – Volume B.
- Red Font is used to cross reference to the location of all appendices, illustrations and references to interacting environmental factors in other chapters of the EIA Report.
- At the beginning of each chapter is a **table of contents, lists of figures**, and **list of appendices**, to make the EIA Report easier to navigate.
- A **Glossary of Terms** and **list of abbreviations** (if required), is located under the table of contents, figures and appendices for each chapter.
- Red Font is also used for indicating the relevant Chapter in the page header.
- **EPA evaluation criteria and definitions** are used across all the topic Chapters. EIA Report Descriptive Terminology is set out in Section 2.5 above.

2.6.1 Presentation of Cumulative Evaluations in the EIA Report topic chapters

So that the information for the **cumulative evaluation** is clearly distinguishable from the information on the subject development, all information on other projects (other elements of the Whole UWF Project or Other Projects & Activities) which facilitated the cumulative evaluation is highlighted in light grey.

In the evaluation sections of each environmental topic chapter, the cumulative information appears greyed out but the cumulative evaluation at the bottom of each evaluation table appears again with white background, as it serves as the cumulative evaluation of the whole project.

Please Note: In some instances, the Subject Development will not cause any effects by itself, and therefore cannot have a cumulative effect. However, the Other Elements are considered because the 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.

UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 3: The Scoping Consultations

October 2019

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

Glossary of Terms

Term	Definition
EIA Directive	European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU)
Consented Windfarm	Upperchurch Windfarm – 22 wind turbines, substation, windfarm roads and ancillary works, consented in August 2014 under Planning Reference: Tipperary County Council 13/51/0003, ABP PL 22.243040
Element	One of the 5 No. elements listed in 'Whole UWF Project' below.
Whole UWF Project	Whole project made up of 5 No. elements – Element 1: UWF Grid Connection; and the Other Elements - Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm and Element 5: UWF Other Activities.

List of Abbreviations

Abbreviation	Full Term
ABP	An Bord Pleanála
BCI	Bat Conservation Ireland
BWI	Birdwatch Ireland
DAU	Developments Application Unit of Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
EDL	Ecopower Developments Limited
EPA	Environmental Protection Agency

Abbreviation	Full Term
IFI	Inland Fisheries Ireland
NPWS	National Parks and Wildlife Services of Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
SAC	Special Area of Conservation
SPA	Special Protection Area (for wild birds)
UGC	Underground Cable

Executive Summary

Article 6 of the EIA Directive requires consultations with two different groups on the content of the EIA Report – (1) public authorities and NGOs who are likely to be concerned, and (2) the public.

The **principal bodies consulted, who engaged with the EIA Report Team**, included

- An Bord Pleanála (Strategic Infrastructure Division)
- Tipperary County Council (Planning and Roads Departments)
- Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs; Development Application Unit (DAU)
- National Parks and Wildlife Service (NPWS)
- Inland Fisheries Ireland (IFI)
- Irish Water
- Transport Infrastructure Ireland (Tii)
- National Federation of Group Water Schemes.

As well as personal contact with landowners associated with the Mountphilips Substation and the Consented UWF Substation and landowners generally involved in the consented Upperchurch Windfarm, part of the public consultation included a **Public Consultation and Information Day.**

The public are informed before the Planning Application is lodged with An Bord Pleanála, through the EIA Portal hosted by the Department of Housing, Planning and Local Government. Also, the planning documents submitted to An Bord Pleanála, are available for inspection at their office at 64 Marlborough Street, Dublin 1, and on the Applicant's **dedicated project website at www.upperchurchwindfarmgridconnection.ie.**

3 THE SCOPING CONSULTATIONS

The main provisions of the EIA Directive on consultations are Articles 6 and 7. Article 7 relates to projects which are likely to have significant effects on the environment in another Member State, i.e. transboundary effects, so just Article 6 is relevant here. Article 6 requires consultations with two different groups on the content of the EIA Report 1) public authorities when they are likely to be concerned and 2) the public.

Scoping consultation in the form of written consultation and responses and/or face-to-face meetings took place with the Competent Authorities and with Statutory Bodies and Other Parties that are likely to be concerned. Landowners involved in the project were consulted throughout the design stage and a Public Information Day was held prior to completion of EIAR to appraise the public, in the general area, of the proposed development and invite their views of the proposal.

The consultees and the public were appraised of the details of the UWF Grid Connection. All feedback received was considered and given due consideration in the final design of the subject development; in the content and the extent of the information contained in the EIA Report; and in the methodology employed to examine all factors in the Report.

3.1 Consultation with Competent Authorities

3.1.1 Consultations with An Bord Pleanála

This is the 2nd Application for UWF Grid Connection (2019 Application). The 1st application which was submitted to An Bord Pleanála as Strategic Infrastructure Development, was refused permission on 17/12/2018 (2018 Application). Subsequently in January 2019, EDL commenced pre-application discussions with An Bord Pleanála regarding a revised application for UWF Grid Connection development, comprising the same new 110kV substation at Mountphilips but with a different route for the c.30km of 110kV underground cabling to ascertain if this revised 2019 application would equally constitute Strategic Infrastructure Development (ABP-303385-19). A meeting with An Bord Pleanála was arranged for February 2019.

Summary of February Meeting: A meeting was held on 27th February 2019 attended by An Bord Pleanála officials and EDL representatives in which

- EDL set out the background and planning history of UWF Grid Connection; and stated that the now proposed 2nd application would include a new substation largely the same as per the 2018 application and also a route for the underground cabling within the public road network to the south of the 2018 application cabling route. EDL also stated that two alternative public road routes were considered for the cabling - Newport Route and Toor Route - and that the Newport route was the preliminary preferred route option in the context of mitigation of effects on biodiversity and water. EDL said Tipperary County Council is now generally accepting of a public road cable route and that a meeting has taken place with the local authority on this matter and that a subsequent meeting will take place prior to the lodging of the planning application. EDL confirmed that an informal consultation had taken place with the Local Ranger (NPWS) regarding the location of hen harrier nests sites in the area, and that, generally, the ranger was also of the view that the Newport Route for the cabling, poses less risk of disturbance to the hen harrier in the Slieve Felim to Silvermines SPA. EDL confirmed that Inland Fisheries Ireland has expressed its wish to see a similarly extensive suite of measures to protect watercourses included in the subject application as was included in the previous 2018 application.

- The Board said that any revisions to Mountphilips Substation, from the 2018 application, should be clearly set out in the 2nd application and that if the proposed public road route of the underground cable should diverge off the road carriageway at any point(s), this should be addressed in the accompanying EIAR and NIS. The Board also advised that a detailed Outline Traffic Management Plan for the construction phase should be submitted with the application and that all alternatives to the grid connection method should be robustly addressed within the planning application given the sensitive environment and the constraints in relation to matters such as biodiversity and European Sites. The EIAR should consider alternative grid connection technologies such as overhead lines and alternative connection routes to the national grid, including any that might avoid the SPA altogether. When considering the matter of alternatives, consideration should be given to the weighting system used in the EIAR with an emphasis on environmental impacts.

Request from EDL to Issue a Declaration: On 29th May, 2019, EDL confirm that consultation with the Roads Department of Tipperary County Council has been concluded and EDL formally requested that the pre-application consultation phase of the SID process be closed and that the Board proceed to carry out its Determination.

Determination from An Bord Pleanála: The pre-application process was closed out by letter from An Bord Pleanála on 12th June, 2019. The letter formally served notice that the proposed development falls within the scope of section 182A of the Planning and Development Act, 2000 (as amended) because the Board concluded, based on their Inspector's report, that the proposal constituted Strategic Infrastructure Development on the basis that it relates to the "transmission" of electricity by means of a high voltage line (110kV) and that the proposed substation, although not necessarily SID in itself, forms part of the overall grid connection (conveying electricity at 110kV). Accordingly, the Board has decided that the proposed development would be strategic infrastructure within the meaning of section 182A of the Planning and Development Act, 2000 (as amended). Any application for approval for the proposed development must therefore be made directly to An Bord Pleanála under section 182A (1) of the Act.

Relevant Appendix: Volume C4: EIAR Appendices
Appendix 3.1 Consultation with An Bord Pleanála *(including the ABP Inspectors Report on the consultation)*

3.1.2 Consultations with Tipperary County Council

The 2018 Application for UWF Grid Connection was refused by An Bord Pleanála mainly because the Board considered that the proposed grid connection cable, linking the Consented UWF Substation with the proposed Mountphilips Substation via a cross country route, would result in a significant intervention in the natural environment and adverse impacts to biodiversity and that sufficient consideration had not been provided regarding potential alternative routes for the cable, including the routing of the cable in the local road network.

Following the refusal, in January 2019 consultation on utilising the public road network for the grid connection cable commenced with Tipperary County Council. A meeting was held in the Civic Offices in Nenagh on 14th February, 2019 attended by Tipperary County Council Roads Department; EDL and civil and electrical engineers from TLI Group when two potential routes were discussed. Both proposed routes are along the public road- One on the R503 mainly (Newport Route) and; a Second on the R503 and then on a series of Local Roads, north of the R503 through Toor (Toor Route).

Over the course of this meeting and subsequent email and phone contacts, the concern of the Roads Department about possible disruption to the Council's annual pavement works programme and particularly the planned programme for Newport Town, due to proposed cabling along the Newport Route, was

discussed. The Council expressed a preference for the Toor Route, which avoided Newport Town. EDL explained that in the context of effects on European Sites (Slieve Felim to Silvermines SPA and Lower River Shannon SAC) a preliminary examination of alternatives would indicate a preference for the Newport Route. A final route was eventually agreed between both parties. This agreed route utilises the R503 from the turn off with the local road L2264-50, for the Consented UWF Substation, to the edge of Newport Town at the GAA club and then follows the Local Road network around that town and as far as the proposed Mountphilips Substation. This is the best alternative in the context of protection of Biodiversity and Water, whilst avoiding interference with the Council's works programme for Newport Town. A **Letter of Agreement** to the use of this route was issued by **Tipperary County Council on 24th July, 2019.**

Julie Brett of EDL spoke to Sonja Reidy, Senior Executive Planner, Tipperary County Council by phone on 24th July, 2019. Ms Reidy confirmed that the planning department did not have any other particular requirements for the EIA Report and that her department were familiar with the consultation carried out with the Roads Department of Tipperary County Council.

Relevant Appendix: Volume C4: EIAR Appendices

Appendix 3.2: Consent of Roads Authority of Tipperary County Council to the Making of a Planning Application

3.2 Consultation with Statutory Bodies and Other Parties

3.2.1 Consultation with National Parks & Wildlife Service and Inland Fisheries Ireland

Consultation was undertaken with the Development Application Unit (DAU) of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs (NPWS); and Inland Fisheries Ireland (IFI). These consultations were led by Inis Environmental Consultants, the authors of the Biodiversity topic chapter and the Appropriate Assessment Reporting. A schedule of these consultations is set out in Table 3-1 below.

Table 3-1: Chronology of formal Biodiversity related consultation both issued to and received from statutory and non- statutory environmental agencies and organisations

Date	Consultees	Action
18/01/2019	National Parks & Wildlife Services (NPWS)	Phone call to Áine Lynch (NPWS) on Jan 18th responded to on January 22nd, 2019 regarding any possible Hen Harrier nest locations along the new proposed route of the 110kV UGC or near to the consented Upperchurch Windfarm or UWF Related Works, and an informal opinion on the alterative Newport/Toor routes.
13/03/2019	Development Applications Unit (DAU)	Consultation letter (per Appendix 3.3) describing the proposed revised UWF Grid Connection development and associated mapping sent to Development Applications Unit.
13/03/2019	Inland Fisheries Ireland (IFI)	Consultation letter (per Appendix 3.3) describing the proposed revised UWF Grid Connection development and associated mapping sent to Jane Gilleran & Michael Fitzsimons, Inland Fisheries Ireland.
19/03/19	Inland Fisheries Ireland (IFI)	Email exchange of maps with Mike Fitzsimons (IFI), detailing watercourse crossing methods and Outline Construction Methodologies (OCMs).
21/03/2019	Inland Fisheries Ireland (IFI)	Onsite meeting with Mike Fitzsimons (IFI), methodology for watercourse crossing works discussed, watercourse crossing points visit with particular focus on bridge crossings along the 110kV UGC route.
22/05/2019	Development Applications Unit (DAU)	Consultation letter describing the final route of the 110kV UGC with the 110kV UGC avoiding the Newport town and map showing same, sent to Jane Gilleran & Michael Fitzsimons, Inland Fisheries Ireland.
05/06/2019	Development Applications Unit (DAU)	Email sent to DAU requesting confirmation of receipt of consultation letter originally sent on 22/05/2019
06/06/2019	Inland Fisheries Ireland (IFI)	Consultation letter describing the final route of the 110kV UGC with the 110kV UGC avoiding the Newport town and map showing same, sent to Jane Gilleran & Michael Fitzsimons, Inland Fisheries Ireland.
06/06/2019	Bat Conservation Ireland (BCI)	Consultation letter containing project description and map of proposed UWF Grid Connection sent to Bat Conservation Ireland.
06/06/2019	Birdwatch Ireland	Consultation letter containing project description and map of proposed UWF Grid Connection sent to Birdwatch Ireland.
09/08/19	Inland Fisheries Ireland (IFI)	Onsite meeting with Mike Fitzsimons (IFI), methodology for watercourse crossing works discussed, watercourse crossing points visit with particular focus on bridge crossings along the 110kV UGC route

Relevant Appendix: Volume C4: EIAR Appendices

Appendix 3.3: Letters sent by Inis Consultancy to Birdwatch Ireland; Bat Ireland; IFI; and NPWS

3.2.2 Consultation with other Statutory Bodies and Parties

Scoping consultations were also carried out with other statutory bodies including the environmental authorities and local and regional authorities, NGOs and other parties who were likely to have either or both, a thematically specific or area specific concern.

Written consultation in the form of the scoping document (and follow up meeting with Irish Water) took place with statutory consultees and other agencies or bodies – listed in Table 3-2.

Table 3-2: Other Statutory Consultees, Other Agencies or Bodies Contacted

Consultee	Type of Consultation	Summary of Feedback
Irish Water	Written – Reply in Appendix 3.5 Meetings in March & August 2019	General Reply about the required content of the EIA Report and site investigations prior to commencement of construction. Follow up meetings with Matthew O'Leary Newport Area Manager Irish Water in March 2019. Responsibility for Irish Water infrastructure from east of Newport Town to Mountphilips Substation Site. Donal Ryan Kilcommon Area Manager Irish Water in August 2019. Responsibility for Irish Water infrastructure from Consented Upperchurch Windfarm Substation to east of Newport Town. During these meetings the route of the 110kV trenching was driven and key Irish Water infrastructure was identified including wells northeast of Newport Town and drilling pits for recently placed pipes particularly in the R503. Discussion of the remedial action that would be required in the case of accidental damage to the main distribution pipes and those feeding directly into houses. General discussion on the layout of the pipes under the roads. Project Design Measure PD09 to ensure protection of Irish Water assets, was developed as a result of these meetings. See Chapter 5: Section 5.2.3.
Southern Regional Assembly	Written – No Reply	Reply to Scoping Consultation for the 2018 UWF Grid Connection will be taken into account in this EIA Report i.e SRA requested that account be taken of Regional Planning Guidelines and in particular the Mid-West Regional Planning Guidelines 2010-2022.
Department of Communications, Climate Action and Environment	Written –No Reply	
Office of Climate, Licensing & Resource Use, Environmental Protection Agency	Written – No Reply	
Department of Agriculture,	Written –	Reply Appendix 3.5

Consultee	Type of Consultation	Summary of Feedback
Food and the Marine	Acknowledgement only	
Commission for Regulation of Utilities	Written – No Reply	
Health and Safety Authority	Written – No Reply	
Health Services Executive - Naas	Written – No Reply	Reply to Scoping Consultation for the 2018 UWF Grid Connection will be taken into account in this 2019 EIA Report i.e HSE requested that the assessment should include particulars of Public Consultation, Noise, Ground and Surface Water protection.
Institute of Public Health	Written – No Reply	
Transport Infrastructure Ireland	Written – Reply in Appendix 3.5	Requirements set out for any proposed works to the National Roads Network (N/A). Request that a TTA be carried out. Haul routes to be identified and examined. TII Publications to be used as reference documents for the TTA; the EIAR and assessment, design, construction and maintenance standards. Reply Appendix 3.5
The Heritage Council	Written – No Reply	
An Taisce	Written – No Reply	
IDA Ireland	Written – No Reply	
Coillte Teo	Written – No Reply	
Waterways Ireland	Email – No Reply	
An Chomhairle Ealaíonn (Arts Council of Ireland)	Written – No Reply	
Fáilte Ireland		
Irish Aviation Authority	Written – No Reply	
Office of Public Works	Written – No Reply	Reply to Scoping Consultation for the 2018 UWF Grid Connection will be taken into account in this 2019 EIA Report, i.e OPW Limerick office requested that Section 50 Application for new or altered water crossing structures to be made to the OPW following the receipt of planning permission. Advised that 2013 Guidelines are followed, 900m minimum diameter of new crossing structures, bedding in of structures and sizing of structures to cope with a minimum 100 year flood event.
Geological Survey of Ireland	Written	

Consultee	Type of Consultation	Summary of Feedback
	– No Reply	
National Federation of Group Water Schemes	Email correspondence with NFGWS and Tipperary County Council.	NFGWS and Tipperary County Council confirmed that they have no concerns regarding Group Water Schemes in the area. Appendix 3.5
Sustainable Energy Authority of Ireland (SEAI)	Written – No Reply	
Friends of the Irish Environment	Written – No Reply	

Relevant Appendix: Volume C4: EIAR Appendices

Appendix 3.4: EDL Consultees Schedule & Sample Letter

Appendix 3.5: Replies from Statutory Bodies to EDL Consultation

3.3 Consultation with the Public

3.3.1 Public Consultation prior to Submission of the Application

As part of the public consultation element, EDL held an information day in the following two venues (at the same time and date) - Rear Cross Community Centre and Lee's Bar, Newport - on Friday 5th July, 2019, from 3pm to 7pm. The events were advertised in the two newspapers widely read locally – the Tipperary Star and the Nenagh Guardian and the Rear Cross Kilcommon Newsletter; by word of mouth through the landowners involved in the windfarm; postering in and around the two venue locations and by email to the local authority members representing the relevant municipal districts i.e Templemore Thurles Municipal District and Nenagh Municipal District.

Plate 3-1: Public Information Day at Rear Cross Community Centre

EDL representatives were present to provide information, answer any questions and engage in consultation on the details and timing of the Subject Development and on the other elements of the Whole UWF Project. The EDL representatives were;

- Phil Kenealy (EIA Coordinator) and Pat Brett (CEO EDL) attended Rear Cross.
- Julie Brett (EIAR Coordinator) and Jack Brett (Project Design Team & Landowner Liaison, EDL)

Most attendees were landowners involved in the windfarm. The landowners had a general interest in the whole Upperchurch Windfarm project and in the new routing of the underground cable. Of the 3rd parties who attended all were local to the subject development area. Their interests in the project are listed below:

- Proximity of the cabling works to their private property
- Watercourse Crossing works (particularly in the Lower Rive Shannon catchment and SAC) and protection measures that will be put in place
- General interest in protection of archaeology

Action from the events:

- None required.

Relevant Volume C4 EIAR Appendices

Public Consultation was carried out according to Appendix 3.6: Community Liaison & Consultation Strategy.

Advertising details in Appendix 3.7: Public Information Day.

3.3.2 Public Consultation on Submission of the Application

The public will be informed before the Planning Application is lodged with An Bord Pleanála, through the EIA Portal hosted by the Department of Housing, Planning and Local Government

http://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1.

The planning documents submitted to An Bord Pleanála are available for inspection at their offices in 64 Marlborough St, Rotunda, Dublin 1, D01 V902 and at the offices of Tipperary County Council, Civic Offices, Nenagh, County Tipperary.

In addition, all the application documents are available on the Applicant's dedicated project website at www.upperchurchwindfarmgridconnection.ie. The project website will also include details of the submission/observation procedure for the public and contact details of the Applicant.

UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 4: Alternatives Considered

ECOPOWER

October 2019

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Figure GC 4-2	Alternative Routes considered for the 110kV UGC from Rear Cross to Coole Crossroads

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

Glossary of Terms

Term	Definition
Consented Windfarm	Upperchurch Windfarm – 22 wind turbines, substation, windfarm roads and ancillary works, consented in August 2014 under Planning Reference: Tipperary County Council 13/51/0003, ABP PL 22.243040
Element	One of the 5 No. elements listed in 'Whole UWF Project' below.
Grid Connection Offer	Offer from the System Operator to connect a generator plant to the national electricity grid, by a specified method.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Switchgear	The combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment.
System Operator SO	Operators of the national electricity grid – Eirgrid (TSO Transmission System Operator) or ESB Networks (DSO Distribution System Operator)
Whole UWF Project	Whole project made up of 5 No. elements – Element 1: UWF Grid Connection; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm and Element 5: UWF Other Activities.

List of Abbreviations

Abbreviation	Full Term
AIS	Air Insulated Switchgear
CER	Commission for Energy Regulation (now CRU – Commission for the Regulation of Utilities)
DSO	Distribution System Operator – ESB Networks, operator of distribution system to end customer
EDL	Ecopower Developments Limited
GIS	Gas Insulated Switchgear
Node	Electricity System grid connection point
OHL	Overhead Line
SAC	Special Area of Conservation
SO	System Operator, operator of the electricity system
SPA	Special Protection Area (for wild birds)
TSO	Transmission System Operator – Eirgrid, operator of the transmission system between generator plants
UWF	Upperchurch Windfarm
UGC	Underground Cables

Executive Summary

This Consideration of Alternatives chapter examines the alternatives for **Grid Connection Node Location; Grid Connection Technology (Overhead Line v Underground Cable); Alternative Public Road Routes for the Underground Cable; Alternative locations for Mountphilips Substation; Alternative Processes** and the **'Do-Nothing' Alternative**.

Grid Connection Locations

The sustainable and efficient use of the national grid infrastructure underpins the Eirgrid/ESBN Group Processing Approach which was implemented in the 'Gates' Grid Connection process. The assignment of connection points for new renewable electricity generation to the national grid requires in-depth planning and technical investigations to identify the optimum connection point for each Group where the reliability and safety of the grid would be maintained.

Limerick City is the nearest 'load centre' (electricity user) with the capability to use the large amount of electricity generation from Upperchurch Windfarm and it is technically practical, efficient and sustainable to connect a large generator to the national grid at a location on the network close to a suitably large load centre, without undermining the stability and safety of the grid. The Killonan Station is located 5km to the southeast of Limerick City centre, and is one of the main transmission system stations in the country. The Killonan Station forms the main bulk supply point for the Mid-West region – power is distributed through the Killonan Station using numerous regional networks at all voltages (110kV, 38kV and 20kV). One of these regional networks is the Killonan to Nenagh 110kV OHL, which is c.41km long, originating in the Killonan 220kV Station and ending in the Nenagh 110kV/38kV Substation. The Killonan – Nenagh 110kV OHL is one of the main electricity supplies into Nenagh town. Unlike the Killonan Station, the Killonan – Nenagh 110kV OHL has capacity to take the substantial amount of electricity which will be generated by Upperchurch Windfarm. This is why a connection at a new node on the Killonan to Nenagh 110kV line was allocated to Upperchurch Windfarm under Gate 3 in the first place.

There are strict criteria for applying for a modification to the allocated grid connection node. A Modification Request to change the connection node on the national grid, from the one allocated for Upperchurch Windfarm under it's Gate 3 Grid Connection Agreement, would not be considered acceptable by the System Operator because there is not enough available electrical capacity at other 110kV stations (i.e. Nenagh, Thurles, Tipperary and Cauteen Stations) in the region to accept the large amount of electricity that Upperchurch Windfarm will generate. The Killonan Station does not have the capacity to take this volume of electricity without requiring major station works, including extension works. The location of the grid connection point has been planned in the context of the available capacity on an overhead line (i.e. Killonan – Nenagh 110kV OHL) which connects to the main bulk supply point for the Mid-West Region – i.e. Killonan Station, which is located beside a suitably large load centre, (i.e Limerick City) to accept the large electricity generation capacity of Upperchurch Windfarm. The connection will be via a new looped in substation beside the overhead line at Mountphilips. This new substation will increase the Limerick/Tipperary transmission system security, increase the Killonan-Nenagh 110kV OHL stability and improve the system circuits Control and Protection.

Therefore, having examined alternative connection nodes (locations) for connecting Upperchurch Windfarm to the national grid, there was no other technically feasible alternative to the connection point prescribed in the ESBN Grid Connection Agreement (a new node to be built at Mountphilips along the Limerick to Nenagh 110kV line), and the prescribed connection node was considered to be the optimum location for connection to the national grid.

Grid Connection Technology (OHL v UGC)

Of the 2 no. alternative technologies – Overhead Line (OHL) and Underground Cable (UCG), neither technology was considered likely to cause significant effects. Overhead Line technology will have minimal effect on Public Roads or Road Users, but because of the technical requirements of Overhead Line technology, the OHL would need to be routed through the open countryside, which places construction works within natural habitats and close to watercourses. Moderate negative effects could occur to Biodiversity and Water receptors as a result. Because of its above ground characteristics, moderate negative effects to Landscape could also occur in this rural setting.

On the other hand, although Underground Cable technology will have negative Slight to Moderate effects on Road Users or to Public Roads; it is because of its location on public roads, that effects to natural habitats are avoided, and effects to animal species and watercourses are minimised.

When the emphasis is placed on the natural environment the use of underground technology (in public roads) is a better alternative than Overhead Line technology and therefore the underground cable alternative was chosen for the grid connection technology to the connection Node prescribed in the Upperchurch Windfarm Grid Connection Agreement.

Alternative locations and designs for the Mountphilips Substation

3 no. alternatives were considered for Mountphilips Substation – Gas Insulated Switchgear (GIS) substation on the western side of the OHL, GIS substation on the eastern side of the OHL or Air Insulated Switchgear (AIS) substation on the eastern side of the OHL. GIS on the western side of the OHL is likely to cause significant effects due to the requirement for outages of the Killonan to Nenagh 110kV OHL for a period of c.6months, while the OHL is not the only source of electricity into Nenagh town and surroundings, it is the main source, and an outage of this length presents a serious risk of electricity supply interruption in the Nenagh area, and is not considered to be acceptable.

While neither design at Site B is likely to cause significant effects, when the emphasis is placed on the natural environment it was considered that 'AIS at Site B' had least potential to cause significant effects to the natural environment due to the much smaller size of buildings within the substation and the shallow depth of excavations, and therefore 'AIS at Site B' was chosen for the location and design of the Mountphilips Substation.

Alternative Public Road Routes for the UGC

Three routes were considered; (1) Local Road through Toor, (2) R503 (through Newport), and (3) R503 (avoiding Newport).

In relation to effects to hen harrier, the 'Local Road through Toor' option is routed along very lightly trafficked local roads through a sparsely populated area, whereas the 'R503' routes are on busier roads through more densely populated areas. The baseline environment along the 'Local Road through Toor' route is considered to be a quiet rural area and it is considered that construction works will present a noticeable contrast to these quiet baseline conditions and therefore there is greater potential to disturb or displace hen harrier. On the R503 routes, by comparison, there are much higher volumes of traffic, much higher number of houses and development and a generally higher level of baseline activity and noise from the vicinity of the regional road and the local roads around Newport town.

In relation to the Lower River Shannon SAC, the Local Road through Toor is routed in close proximity to the SAC, which increases the potential for effects. The R503 routes on the other hand, are at least 1km from the SAC at the majority of works locations.

When the effects on Public Roads and Road Users is taken into account, 'Local Road through Toor' option will have low levels of effects mainly due to the very low number of road users and population in this area; when the two R503 options are considered, the 'R503 (avoiding Newport)'route is preferable to the 'R503 (through Newport)' route because of the ability to avoid traffic delays and road works in the town, and avoid affecting the Tipperary County Council planned pavement works in Newport Town which are scheduled for 2019.

Of the 3 no. alternative routes for the Underground Cable, none of the routes was considered likely to cause significant effects. When the emphasis is placed on biodiversity matters in this particular examination (the 3 No. alternative public road routes), either of the 'R503 routes' are preferable to the 'Local Road route through Toor' route, when the Hen Harrier species and the Lower River Shannon SAC is considered. When the effects on Material Assets are also taken into account, the R503 (avoiding Newport Town) is the best alternative. Therefore the **R503 (avoiding Newport Town) route alternative was chosen for the UGC route** to the connection Node prescribed in the Upperchurch Windfarm Grid Connection Agreement.

Alternative Processes

An examination of the processes associated with the project, by the Design and EIAR evaluation teams, resulted in alternative processes being devised to avoid, prevent or reduce environmental effects. These alternative processes are an intrinsic part of the design of the UWF Grid Connection project. These included the scheduling of construction works in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands; the sequencing of watercourse crossing works, earthworks, dewatering and excavation dewatering within 50m of a watercourse; the scheduling of construction works along the 110kV UGC to occur outside of the hen harrier breeding season; and the design of security lighting and restriction of construction works to daylight hours to minimise effects to bats.

The 'Do Nothing' Alternative

The very high impact of Climate Change to biodiversity and to our human wellbeing, is reflected in the Irish Oireachtas declaring a climate and biodiversity emergency on the 9th May 2019.

The most significant impact of UWF Grid Connection not being developed is the secondary impact of Upperchurch Windfarm not being developed; this would be a **significant lost opportunity to contribute to Ireland's action on Climate Change remediation.**

In the 'do-nothing' alternative, **not developing the Upperchurch Windfarm project means that** there will be a consequential loss of the carbon offset potential and **the emission of 106,216 tonnes of greenhouse gases every year from the generation of electricity by fossil fuel plant would not be avoided**.

4 Alternatives Considered

4.1 Introduction

The consideration of alternatives is a requirement of Annex IV (2) of the EIA Directive[1] where it states;

"A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of environmental effects the."

In this Chapter 4, a description of the reasonable alternative locations, technologies and processes which were considered, is presented.

4.1.1 Background to Upperchurch Windfarms grid connection Offer

Upperchurch Windfarm was granted a Grid Connection Offer from ESB Networks that allows the windfarm to connect and export electricity, to the National Grid. This Grid Connection Offer prescribed ESB Network's approved connection method to the national electricity grid for Upperchurch Windfarm per;

1. A new 110kV substation node at a point along the Killonan to Nenagh 110kV overhead line, in the Freagh[2] area, near Newport, County Tipperary.
2. An underground cable c.30km in length routed eastwards linking this new substation node back to the Windfarm Substation (already consented) at Upperchurch Windfarm.

4.1.2 Alternative to the First UWF Grid Connection Application

This is the second Application (2019 Application) to An Bord Pleanála for planning permission for the UWF Grid Connection works, designed in accordance with the grid connection requirements as prescribed by ESB Networks, in the Upperchurch Grid Connection Offer.

The Grid Connection Offer stipulated that Upperchurch Windfarm connects by 110kV underground cable (110kV UGC), to a new substation node to be built under the existing Killonan to Nenagh 110kV line. This new substation node will be constructed in Mountphilips townland. The route of the 110kV UGC is not specified. In the first 2018 UWF Grid Connection Application, Ecopower proposed a route for the 110kV UGC from the proposed new substation at Mountphilips to the windfarm substation that was a predominately cross country route along farm and forestry roads, and across farm and forestry lands. The 2018 Application was refused by An Bord Pleanála (the Board), in December 2018. In the Reasoned Conclusion of the Board Order it states;

[1] EIA Directive 2011/92/EU as amended by Directive 2014/52/EU

[2] The 110kV overhead line does not exist in Freagh townland, the closest townland to Freagh through which the 110kV overhead passes through is Mountphilips townland, which is to the west of Freagh townland. The location of the new node is described as Mountphilips in this EIAR.

The Board is not satisfied that sufficient consideration has been provided regarding the routing of the cable in the local road network or consideration of alternative grid connection technologies such as overhead line alternatives. Furthermore, no information has been provided in relation to alternative connection locations where the windfarm could potentially connect to the national electricity grid.

Therefore, this Consideration of Alternatives includes an examination of alternative grid connection locations, alternative grid connection technologies, and alternative routes to the national grid - Section 4.2, 4.3 & 4.5 respectively.

The examination takes into account comments and conclusions in the Board's Order and the Inspector's Report on the 2018 UWF Grid Connection Application (ABP-301959-18). The Inspectors Report is available at http://www.pleanala.ie/casenum/301959.htm

4.2 Alternative Grid Connection Location for Upperchurch Windfarm

This Section 4.2 sets out the all-island electricity system context and legislative context for any change that might be proposed to the grid connection location/node as set out in the Grid Connection Offer (a new node to be built at Mountphilips) that has been secured for Upperchurch Windfarm, from ESB Networks. Alternative grid connection nodes for Upperchurch Windfarm, in the general area, are also examined.

4.2.1 Gate 3 Grid Connection Offers

Prior to the Enduring Connection Policy (ECP) system, which allocates grid connection offers to prospective generators, being adopted by Eirgrid and ESB Networks in 2018, all renewable generator grid connections were processed in a 'Gate' system wherein all applications to connect to the electricity grid, that have met defined criteria, were processed in tranches (Gate 1, Gate 2 & Gate 3) by the relevant electricity network System Operator. Ecopower received a Gate 3 Grid Connection Offer from ESB Networks for Upperchurch Windfarm (Gate 3 Ref. DG96) and has accepted this Offer and secured a Grid Connection Agreement with ESB Networks.

The feasibility or viability of an alternative to the node identified in the Grid Connection Agreement would need to be verified in the context of Higher Level Plans produced in collaboration, by the national electricity System Operators, the Regulator of Utilities (all-island) and government legislation. These Higher Level Plans are explained in the following sections 4.2.2. & 4.2.3.

The following acronyms are used in this Section 4.2:

RES-E	Renewable Energy Sources - of Electricity
CER	Commission for Energy Regulation (now CRU – Commission for the Regulation of Utilities)
SO	System Operator, operator of the electricity system
TSO	Transmission System Operator – Eirgrid, operator of the transmission system between generator plants
DSO	Distribution System Operator – ESB Networks, operator of distribution system to end customer
Node	Grid Connection Point

4.2.2 General - RES-E on the Irish Electricity Grid

The EU 2001 RES-E Directive on the promotion of Electricity Generation from Renewable Energy Sources[3] in the internal EU electricity market states the following

Without prejudice to the maintenance of the reliability and safety of the grid, Member States will take the necessary measures to ensure that the transmission system operators and distribution system operators in their territory guarantee the transmission and distribution of electricity produced from renewable sources

This means that grid access must put in place measures to facilitate grid access for renewable sources of electricity while at the same time maintaining the reliability and safety of the grid.

The distribution and trading of electricity in Ireland is a 'Whole Island' system. In order to commence implementation of the RES-E Directive, the Utility Regulators - CER (Rep. of Ireland) and the Office for the

[3] RES-E Directive 2001/77/EC https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32001L0077

Regulation of Electricity and Gas (N. Ireland) commissioned a study to explore the effects of increasing levels of wind energy generation on the combined electricity systems of the whole island and this study was completed in 2003.[4] This was followed by further studies by the Utility Regulators and the electricity System Operators on the technical aspects of large amounts of wind generation on the grid; on granting grid connections for this generation and on the requirements for a new Wind Grid Code for these new grid generators accessing and operating on the grid.

In 2004, the TSO/Eirgrid and the DSO/ESBN published their proposal for a Group Processing Approach (GPA) for Renewable Energy Grid Connections – the Connection Offer Policy and Process Paper (COPP)[5]. This involved dividing renewable energy grid connection applications into Groups based on geographical areas. The TSO and DSO then carried out technical studies to identify the optimum connection point for each Group where the reliability and safety of the grid would be maintained. Both System Operators (Eirgrid and ESBN) then identified the connection method for each grid application within the Group/Sub-Group. The System Operators then issued grid connection offers in batches, for individual Nodes. Gate 1 offers to renewable projects commenced in December 2004. These were followed by Gate 2 and Gate 3 offers in the following years, all under the legal framework of various CER Directives.

In 2008, Eirgrid published it's long term grid development strategy, GRID25[6]. This strategy was based on a robust and stringent analysis of the long term needs of electricity users nationwide and includes solutions to deliver high quality, secure and economic power supplies in line with best international practice. The Gate 3 grid connection process (comprising wind energy generated electricity only) commenced in December 2008.

4.2.3 General - Modifications to a Gate 3 Grid Connection Agreement

It is anticipated in the Eirgrid/ESBN's Connection Offer Policy and Process Paper (COPP) that on occasion alternatives to the grid connection method, to that offered by the System Operator in the Grid Connection Offer, may be requested by the Gate 3 Connection Offer client.

It states in the COPP that the System Operator is open to accommodating Modifications to the Grid Connection Agreement, where feasible and within certain strict criteria. Any modification must meet the criteria set out in 'Clause 18.2: Ruleset of COPP' per;

- *It is technically feasible and there are no negative significant system, planning or environmental implications associated with the proposed connection method;*
- *It is in line with the general principles of the Group Processing Approach;*
- *Where the change impacts on shared assets any costs impact shall be to the account of the party requesting the change;*

[4] The Impacts of Increased Levels of Wind Penetration on the Irish Electricity Systems https://www.cru.ie/document_group/cer-ofreg-wind-study-report/

[5] Connection Offer Policy and Process Paper COPP (ESBN/Eirgrid May 2011) https://www.esbnetworks.ie/docs/default-source/publications/connection-offer-policy-and-process-paper.pdf?sfvrsn=a05c33f0_4

[6] Eirgrid GRID25 http://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-GRID25.pdf

- *Where the change impacts on shared assets any impact other than cost – for example an impact on the timeline for delivery - must be agreed in writing by all projects affected;*
- *It is consistent with the long term development of the system including, but not limited to:*
- *Not adversely impacting upon the ability of the SOs to obtain necessary planning consents for other system developments in either the short or medium term.*
- *Not adversely affecting scarce station, or line routing capacity for potential future system development to the benefit of all customers.*
- *Not likely to lead to higher charges for existing or connecting customers which includes those within the Gate being processed at the time of the request.*
- *In the event that the change proposed might lead to a delay in connection of other projects, any projects affected must advise their agreement in writing*
- *Not likely to increase costs for the End User.*
- *Not resulting in a change of the designated connection point on the meshed transmission system originally chosen by the SO.*

A modification request to the System Operator to connect at an alternative grid connection Node than that set out in the Grid Connection Agreement will not be granted if it does not meet the strict criteria prescribed in Clause 18.2 (above) of the Eirgrid/ESBN's Connection Offer Policy and Process.

4.2.4 Upperchurch Windfarm in the Gate 3 Process

4.2.4.1 Allocated connection node for Upperchurch Windfarm

During the consideration of a Gate 3 Grid Connection allocation for Upperchurch Windfarm, Eirgrid and ESB Networks conducted detailed studies to determine a technically feasible connection method for the project whilst also considering wider network impacts, including the stability of the grid and the facilitation of other generators.

The grid connection capacity allocated under Gate 3 to Upperchurch Windfarm is an allocation of 94megawatts (MW) of wind generated electricity capacity assigned to Killonan Station. The Killonan Station does not have the existing capacity to take the substantial amount of electricity from Upperchurch Windfarm, without requiring major station works, including extension works. However, there is currently spare capacity on the Killonan to Nenagh 110kV Overhead Line. This capacity can be used for the electricity from Upperchurch Windfarm through the construction of a new looped in substation under the line.

The Killonan – Nenagh 110kV OHL is controlled and fed from the Killonan 220kV Station, which is located to the southeast of Limerick City. The Killonan Station is one of the main transmission system stations in the country with 3 No. 220kV lines feeding into the Station - from Tarbert, Knockraha and Shannonbridge power stations. This power is then distributed through the Killonan Station to the mid-west region using numerous regional networks at all voltages (110kV, 38kV and 20kV). One of these regional networks is the Killonan to Nenagh 110kV OHL, which is c.41km long, originating in the Killonan 220kV Station and ending in the Nenagh 110kV/38kV Substation. The Killonan – Nenagh 110kV OHL is one of the main electricity supplies into Nenagh town.

Killonan Station is located close to Limerick City, which is a major load centre (user of the electricity) on the network. Upperchurch Windfarm will produce a very substantial amount of electricity – c.220,000,000 Kwh/per annum and this electricity will be used to supply both Limerick City and County (and Nenagh Town and surrounding areas *(e.g.220,000,000 Kwh is enough electricity for 74% of the houses in Limerick City and County)*. From a technical, operational and sustainable use of the Transmission System perspective, the System Operator choose a grid connection point for a large high voltage generator near to a major load centre, this is the most sustainable solution.

As a result of in-depth system network investigations by Eirgrid and ESB Networks, the grid connection for Upperchurch Windfarm, is for the connection to be made at a new Node to be built under the Killonan to Nenagh 110kV overhead electricity line (OHL) by way of a new substation at Mountphilips. Also, from the System Operator's perspective, the addition of the new 110kV Mountphilips Looped station onto the National Grid will increase the Limerick/Tipperary transmission system security, increase the Killonan-Nenagh 110kV OHL stability and improve the system circuits Control and Protection.

4.2.4.2 Other Connection Nodes around Upperchurch Windfarm

In the Board Order refusing the 2018 UWF Grid Connection Application, the Board stated that no information had been provided in relation to alternative connection locations where the windfarm could potentially connect to the national electricity grid. Alternative connection locations (nodes) to the new node at Mountphilips, are examined in this section 4.2.4.2.

Because of the large size (capacity) of Upperchurch Windfarm, the electricity must be exported using the 110kV Transmission System. The applicant examined possible alternative connection nodes on the Eirgrid Transmission System, west, north, east and south of Upperchurch windfarm.

Killonan ESB Station ~32km west of Upperchurch Windfarm, Killonan Substation is one of the main transmission system stations in the country. The Killonan Station does not have the existing capacity to take the substantial amount of electricity from Upperchurch Windfarm, without requiring major station works, including extension works. In light of the above, a direct connection to the Killonan ESB Station was not a technically feasible viable alternative to the connection route and method proposed is this application.

Nenagh ESB Station ~30km north of Upperchurch Windfarm, Nenagh Station is connected to the Killonan Station Node by an 110kV overhead line. Nenagh is a 'tail fed' 110kV Station, not being connected to any other 110kV circuits. A Modification application, for Upperchurch Windfarm, to connect to the Nenagh Node would not be acceptable to the System Operators because Nenagh is a 'tail fed' Station and a connection of such capacity would trigger extensive 110kV network upgrade works, at Nenagh Station. There is an existing grid connection offer in place to connect Bunkimalta Windfarm at 38kV into the Nenagh node, which is possible because the electricity can be transported at the lower 38kV voltage for Bunkimalta Windfarm because the capacity of the project is substantially smaller (46MW) than Upperchurch Windfarm and there is adequate existing capacity at 38kV at Nenagh Station. There is limited capacity at 110kV at Nenagh Station, but not enough to cater for the substantial amount of electricity that will be generated at Upperchurch Windfarm. This is irrespective of whether Bunkimalta Windfarm is built, or not. In light of the above, a direct connection to the Nenagh ESB Station was not a technically feasible viable alternative to the connection route and method proposed is this application.

Thurles ESB Station ~20km to the east, does not have the technical capacity to accept the electricity from Upperchurch Windfarm. The capacity at Thurles Station has already been allocated to other (operating) windfarms i.e Lisheen Windfarm, Ballybay Windfarm, An Cnoc Windfarm and Foyle Windfarm. A Modification application, for Upperchurch Windfarm, to connect to Thurles Station would not be acceptable to the System Operators because there is no available capacity remaining at this station. In light of the above, a direct connection to the Thurles ESB Station was not a technically feasible viable alternative to the connection route and method proposed is this application.

Tipperary ESB Station ~34km to the south, does not have sufficient capacity to accept the electricity from Upperchurch Windfarm. The only wind generated capacity connected to Tipperary Station is 3MW from Slievereagh Windfarm (operating). A Modification application, for Upperchurch Windfarm, to connect to Tipperary Station would not be acceptable to the System Operators because of the limited capacity available at the Station. In light of the above, a direct connection to the Tipperary ESB Station was not a technically feasible viable alternative to the connection route and method proposed is this application.

Cauteen ESB Station ~25km to the south, does not have the sufficient remaining capacity to accept the electricity from Upperchurch Windfarm. The capacity at Cauteen Station has already been allocated to other large (operating) windfarms i.e Cappawhite Windfarm A & B, Garracummer Windfarm, Glenough Windfarm, Glencarbry Windfarm and Hollyford Windfarm. A Modification application, for Upperchurch Windfarm, to connect to Cauteen Station would not be acceptable to the System Operators, because there is not enough available capacity remaining. In light of the above, a direct connection to the Cauteen ESB Station was not a technically feasible viable alternative to the connection route and method proposed is this application.

4.2.5 Conclusion to Alternative Grid Connection Location for Upperchurch Windfarm

The sustainable and efficient use of the national grid infrastructure underpins the Eirgrid/ESBN Group Processing Approach which was implemented in the 'Gates' Grid Connection process. The assignment of connection points for new renewable electricity generation to the national grid requires in-depth planning and technical investigations to identify the optimum connection point for each Group where the reliability and safety of the grid would be maintained.

Limerick City is the nearest 'load centre' (electricity user) with the capability to use the large amount of electricity generation from Upperchurch Windfarm and it is technically practical, efficient and sustainable to connect a large generator to the national grid at a location on the network close to a suitably large load centre, without undermining the stability and safety of the grid. The Killonan Station is located 5km to the southeast of Limerick City centre, and is one of the main transmission system stations in the country. The Killonan Station forms the main bulk supply point for the Mid-West regional – power is distributed through the Killonan Station using numerous regional networks at all voltages (110kV, 38kV and 20kV). One of these regional networks is the Killonan to Nenagh 110kV OHL, which is c.41km long, originating in the Killonan 220kV Station and ending in the Nenagh 110kV/38kV Substation. The Killonan – Nenagh 110kV OHL is one of the main electricity supplies into Nenagh town. Unlike the Killonan Station, the Killonan – Nenagh 110kV OHL has capacity to take the substantial amount of electricity which will be generated by Upperchurch Windfarm. This is why a connection at a new node on the Killonan to Nenagh 110kV line was allocated to Upperchurch Windfarm under Gate 3 in the first place.

There are strict criteria for applying for a modification to the allocated grid connection node. A Modification Request to change the connection node on the national grid, from the one allocated for Upperchurch Windfarm under it's Gate 3 Grid Connection Agreement, would not be considered acceptable by the System Operator because there is not enough available electrical capacity at other 110kV stations (i.e. Nenagh, Thurles, Tipperary and Cauteen Stations) in the region to accept the large amount of electricity that Upperchurch Windfarm will generate. The Killonan Station does not have the capacity to take this volume of electricity without requiring major station works, including extension works. The location of the grid connection point has been planned in the context of the available capacity on an overhead line which connects to the main bulk supply point for the Mid-West Region – i.e. Killonan Station, which is located beside a suitably large load centre (i.e Limerick City) to accept the large electricity generation capacity of Upperchurch Windfarm. The connection will be via a new looped in substation beside the overhead line at Mountphilips. This new substation will increase the Limerick/Tipperary transmission system security, increase the Killonan-Nenagh 110kV OHL stability and improve the system circuits Control and Protection.

Therefore, having examined alternative connection nodes (locations) for connecting Upperchurch Windfarm to the national grid, there was no other technically feasible alternative to the connection point prescribed in the ESBN Grid Connection Agreement (a new node to be built at Mountphilips along the Limerick to Nenagh 110kV line), and the prescribed connection node was considered to be the optimum location for connection to the national grid.

4.3 Alternative Grid Connection Technologies Considered

4.3.1 Introduction to Alternative Technologies Considered

The ESB Networks Grid Connection Agreement for Upperchurch Windfarm specifies that the electricity output from the windfarm is supplied onto a new Node on the Killonan to Nenagh 110kV electricity line, via an 110kV underground cable from Upperchurch Windfarm substation.

The Board Order, issued for the Refusal of Permission for the 2018 UWF Grid Connection application, indicated that an alternative grid connection technology, such as an overhead connection line, should be considered as an alternative.

The use of overhead lines would require a modification to the Upperchurch Windfarm Grid Connection Agreement which specifies underground cable. Consideration of a modification to the Agreement by the System Operators, would be subject to the modification criteria set out in Eirgrid/ESBN's Connection Offer Policy and Process (COPP detailed in 4.2.3 above). A modification request to the System Operator to connect using an alternative grid connection technology i.e overhead line, is generally granted because such a modification can usually comply with the COPP Ruleset. Therefore alternative technologies to connect Upperchurch Windfarm substation to the national grid by underground cable (UGC) and by overhead line (OHL) were compared for environmental effects.

4.3.2 Description of the Alternative Technologies Considered – OHL and UGC

The 2018 Application which was refused by the Board, was for a cross-country, underground cable connection to the national grid. Therefore, when alternative technologies for the grid connection cable were being considered, two methods were possible;

1. Underground Cabling (UGC) in the public road network or
2. Overhead Line (OHL).

Description of Underground Cabling (UGC) in the public road network: 110kV UGC is typically installed in trenches c.1.25m deep and 0.6m wide, laid with 5 cable ducts through which the 3 electrical cables, communications cables, and copper cables (if required), are pulled. A length of c.29 - 33km of UGC (the approx. distance by road between Upperchurch Windfarm Substation and the new node selected by ESBN at Mountphilips) would require c. 36 - 40 No. joint bay, communication and link box chambers located at regular points along the route. The ducts are surrounded by concrete and the top of the trench is backfilled and reinstated. The only surface expression of underground cabling in public roads, is the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates, along the route. Spoil for the excavations would be classified as waste and would be disposed of in licenced waste facilities.

Overhead Line (OHL): Newly built Infrastructure would be required to carry the 110kV grid connection overhead line because the existing infrastructure throughout the area, of wooden poles carrying 20kV and 38kV electricity lines and telephone lines, would not have the required engineering or technical specifications to carry an 110kV line. Locating the new 110kV UGC along roadside verges/boundaries is also not technically possible to the number of bends on the public roads (110kV OHL must be constructed in straight lines, with steel pylons at all changes of direction) along with minimum separation distances from other electrical infrastructure and from ground level, therefore a grid connection using Overhead Line technology would be wholly off-road. The Overhead Line would involve c.26 - 30km of 110kV overhead line,

carried on c.150 to 165 structures comprising double wooden poles and steel pylons. The structures would be c.25m high, depending on the terrain.

4.3.3 Comparison of the Environmental Effects of the Alternative Technologies

The comparison of the environmental effects of the alternative technologies (UGC v OHL) uses the assessment methodology which was developed under the EU LIFE project IMPERIA[7].

4.3.3.1 Methodology used to Compare Environmental Effects – IMPERIA

The IMPERIA methodology is an assessment tool which was developed in the EC LIFE project – IMPERIA, for managing impact significance assessment in EIA projects. The IMPERIA methodology is described in full in Section 2.4 of Chapter 2: The EIAR Process including Scoping and is reproduced hereunder for ease of reference to this Chapter 4.

4.3.3.1.1 Overview of the IMPERIA Methodology

In the framework developed under the EC LIFE project - IMPERIA, the evaluation of impact significance uses a replicable, multi-criteria decision analysis, where the sensitivity of the receptor (i.e. the sensitivity of a Sensitive Aspect of the environment) and the magnitude of the change caused by a project are rated using sub-criteria or scales, and then the overall significance is evaluated using a matrix.

4.3.3.1.2 Criteria for Evaluating the Sensitivity of a Receptor

Sensitivity of the receptor is a description of the characteristics of the receptor or aspect of the environment which will be affected by the development. It is a measure of 1) existing regulations and guidance, 2) societal value and 3) vulnerability for the change. The sensitivity of a receptor is estimated in its current state prior to any change implied by the project.

	Criteria for Evaluating the Sensitivity of a Receptor		
Sensitivity	**Existing regulations:** *describes whether there are any such objects in the impact area, which have some level of protection by law or other regulations or whose conservation value is increased by programs or recommendations*	**Societal value:** *describes the value of the receptor to the society and depending on the type of impact may be related to economic values, social values or environmental values. Societal value measures general appreciation from the point of view of society. When relevant, the number of people impacted is taken into account.*	**Vulnerability to change:** *describes how liable the receptor is to be influenced or harmed by changes to its environment*
Low	Few or no recommendations which add to the conservation value of the impact area, and no regulations restricting use of the area (e.g. zoning plans).	The receptor is of small value or uniqueness. The number of people impacted is small.	Even a large external change would not have substantial impact on the status of the receptor. There are only few or none vulnerable receptors in the area.

[7] Improving Environmental Assessment by Adopting Good Practices and Tools of Multi-criteria Decision Analysis (IMPERIA 1.8.2012-31.12.2015) (LIFE 11 ENV/FI/905) https://www.jyu.fi/science/en/bioenv/research/natural-resources-and-environment/imperia-project

	Criteria for Evaluating the Sensitivity of a Receptor		
Sensitivity	**Existing regulations:** *describes whether there are any such objects in the impact area, which have some level of protection by law or other regulations or whose conservation value is increased by programs or recommendations*	**Societal value:** *describes the value of the receptor to the society and depending on the type of impact may be related to economic values, social values or environmental values. Societal value measures general appreciation from the point of view of society. When relevant, the number of people impacted is taken into account.*	**Vulnerability to change:** *describes how liable the receptor is to be influenced or harmed by changes to its environment*
Moderate	Regulation sets recommendations or reference values for an object in the impact area, or the project may impact an area conserved by a national or an international program.	The receptor is valuable and locally significant but not very unique. The number of people impacted is moderate.	At least moderate changes are needed to substantially change the status of the receptor. There are some vulnerable receptors in the area.
High	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas) or international contracts which may have direct impact on the feasibility of the proposed development.	The receptor is unique and valuable to society. It may be deemed nationally significant and valuable. The number of people impacted is large.	Even a small external change could substantially change the status of the receptor. There are many vulnerable receptors in the area.
Very High	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas) or international contracts which may prevent the proposed development.	The receptor is highly unique, very valuable to society and possibly irreplaceable. It may be deemed internationally significant and valuable. The number of people affected is very large.	Even a very small external change could substantially change the status of the receptor. There are very many vulnerable receptors in the area.

A general guide for deriving the **overall sensitivity of a receptor** is to pick the maximum of existing regulations and guidance and societal value and then adjust that value depending on the level of vulnerability.

Determining the Overall Sensitivity of a Receptor	
Low	The receptor has minor social value, low vulnerability for the change and no existing regulations and guidance. Even a receptor which has major or moderate social value may have low sensitivity if it's not liable to be influenced by the development.
Moderate	The receptor has moderate value to society, its vulnerability for the change is moderate, regulation may set reference values or recommendations, and it may be in a conservation program. Even a receptor which has major social value may have moderate sensitivity if it has low vulnerability, and vice versa.
High	Legislation strictly conserves the receptor, or it is very valuable to society, or very liable to be harmed by the development.
Very High	Legislation strictly conserves the receptor, or it is irreplaceable to society, or extremely liable to be harmed by the development. Even minor influence by the proposed development is likely to make the development unfeasible.

4.3.3.1.3 Criteria for Evaluating the Magnitude of an Impact

Magnitude of the impact describes the characteristics of changes the planned project is likely to cause. Magnitude is a combination of 1) intensity and direction, 2) spatial extent, and 3) duration. Assessment of magnitude evaluates the likely changes affecting the receptor *without* taking into account the receptors sensitivity to those changes.

Magnitude	**Criteria for Evaluating the Magnitude of an Impact – Intensity & Direction** *Intensity describes the physical dimension of a development. The direction of the impact/change is either positive (green) or negative (red).*
Very High	The proposal has an extremely beneficial effect on nature or environmental load. A social change benefits substantially people's daily lives
High	The proposal has a large beneficial effect on nature or environmental load. A social change clearly benefits people's daily lives.
Moderate	The proposal has a clearly observable positive effect on nature or environmental load. A social change has an observable effect on people's daily lives
Low	An effect is **positive** and observable, but the change to environmental conditions or on people is small
No impact	An effect so small that it has no practical implication. Any benefit or harm is negligible.
Low	An effect is **negative** and observable, but the change to environmental conditions or on people is small
Moderate	The proposal has a clearly observable negative effect on nature or environmental load. A social change has an observable effect on people's daily lives and may impact daily routines
High	The proposal has a large detrimental effect on nature or environmental load. A social change clearly hinders people's daily lives.
Very High	The proposal has an extremely harmful effect on nature or environmental load. A social change substantially hinders people's daily lives

	Criteria for Evaluating the Magnitude of an Impact – Spatial Extent & Duration	
Magnitude	**Spatial Extent** *describes the geographical reach of an impact area, or the range within which an effect is observable*	**Duration** *describes the length of time during which an impact is observable and it also takes other related issues such as timing and periodicity into account. These are relevant for impacts which aren't observable all the time such as periodic impacts*
Low	Impact extends only to the immediate vicinity of a source. Typical range is < 1 km.	An impact whose duration is at most one year, for instance during construction and not operation. A moderate-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance
Moderate	Impact extends over one municipality. Typical range is 1-10 km	An impact lasts from one to a number of years. A long-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance
High	Impact extends over one region. Typical range is 10-100 km	An impact lasts several years. The impact area will recover after the project is decommissioned.
Very High	Impact extends over several regions and may cross national borders. Typical range is >100 km	An impact is permanent. The impact area won't recover even after the project is decommissioned.

Determining the Overall Magnitude of the Change/Effect: Magnitude of the change is a comprehensive synthesis of its component factors. In a case, where intensity, spatial extent and duration all get the same value, the magnitude would also be given this value. In other cases, intensity is be taken as a starting point, and the assessment is then adjusted based on spatial extent and duration to obtain an overall level of magnitude. The aim is that the overall assessment captures the characteristics of an effect. The table below describes some example descriptions of different categories for the magnitude of the change.

Determining the Overall Magnitude of the Change/Effect	
Very High	The proposal has beneficial effects of very high intensity and the extent and the duration of the effects are at least high.
High	The proposal has beneficial effects of high intensity and the extent and the duration of the effects are high.
Moderate	The proposal has clearly observable positive effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
Low	An effect is positive and observable, but the change to environmental conditions or on people is small
No impact	No change is noticeable in practice. Any benefit or harm is negligible.
Low	An effect is negative and observable, but the change to environmental conditions or on people is small.
Moderate	The proposal has clearly observable negative effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
High	The proposal has harmful effects of high intensity and the extent and the duration of the effects are high
Very High	The proposal has harmful effects of very high intensity and the extent and the duration of the effects are at least high.

4.3.3.1.4 Assessing the overall significance of an impact

The **assessment of the overall significance uses the matrix below,** where positive impacts are in green and negative in red. The matrix is based on the **magnitude of the change** affecting a receptor and on the **sensitivity of the receptor** to those changes.

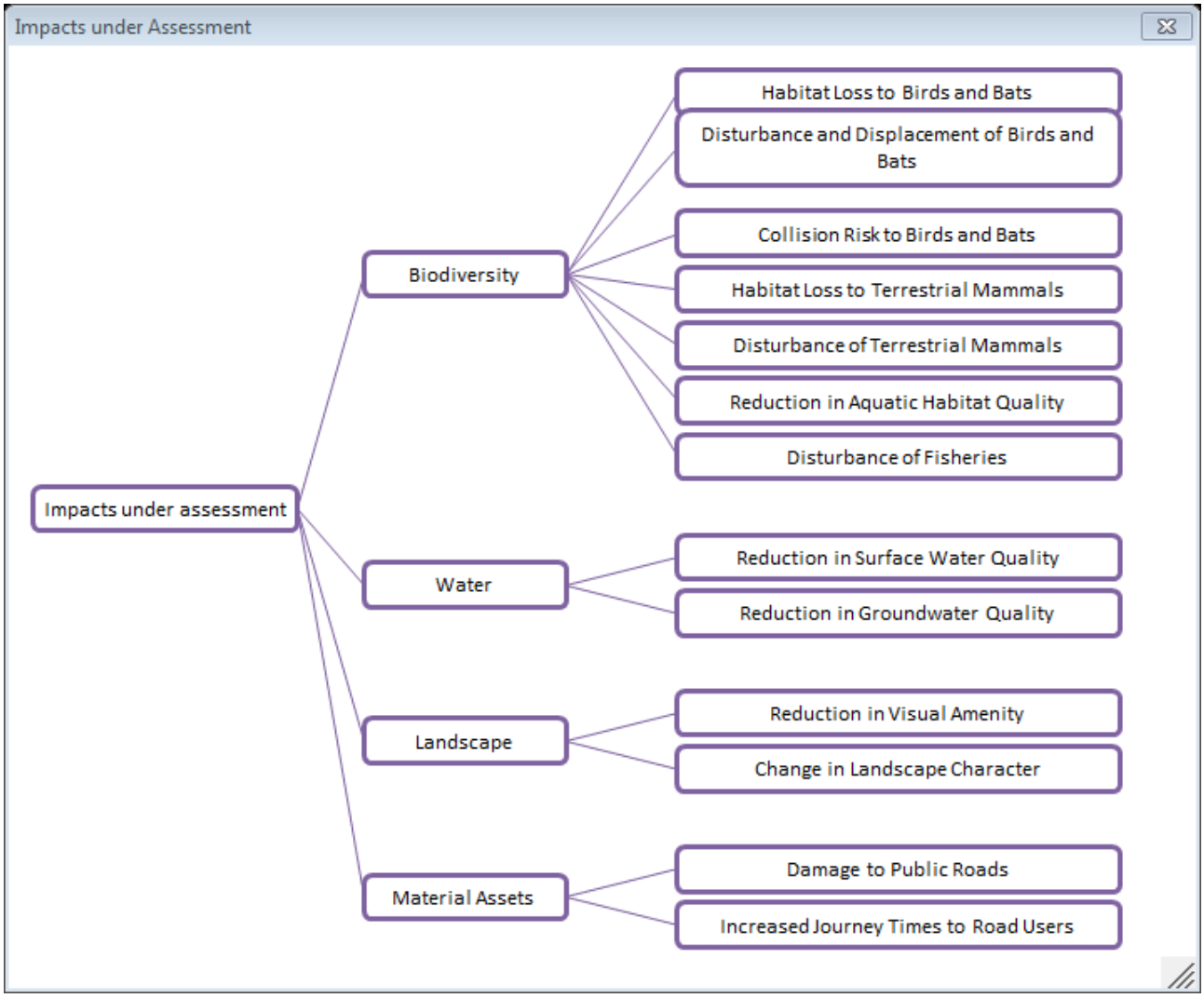
The values obtained from the table are indicative because the most relevant dimensions for characterising an impact are dependent on the type of impact. Thus, some discretion from the expert is required, in particular in cases, where the one component is low and the other one high or very high.

Determining the Overall Significance of an Impact									
Impact Significance		**Magnitude of change**							
		Very High	**High**	**Moderate**	**Low**	**No Impact**	**Low**	**Moderate**	**High**	**Very High**
Receptor Sensitivity	**Low**	Significant*	Moderate*	Slight	Imperceptible	No Impact/ Neutral	Imperceptible	Slight	Moderate*	Significant*
	Moderate	Significant	Significant	Moderate	Slight	No Impact/ Neutral	Slight	Moderate	Significant	Significant
	High	Profound	Significant	Significant	Moderate*	No Impact/ Neutral	Moderate*	Significant	Significant	Profound
	Very High	Profound	Profound	Significant	Significant*	No Impact/ Neutral	Significant*	Significant	Profound	Profound

** Especially in these cases, significance might get a lower estimate, if sensitivity or magnitude is near the lower bound of the classification*

4.3.3.2 Potential Impacts of the Alternative Technologies OHL and UGC

The two technologies capable of transporting the electricity from Upperchurch Windfarm Substation to the new node at Mountphilips, are 110kV underground cable (UGC) or 110kV overhead line (OHL). The technologies are compared for environmental effect on the environmental topics, where there is potential for a significant impact. The environmental factor topics that were assessed and the impacts with potential for significant effect are set out in the Impact Tree below;



4.3.3.3 Comparison of the Environmental Effects on the Topics Chosen

A comparison of environmental impacts of the two alternative grid technologies i.e. UGC or OHL from Upperchurch Windfarm Substation to Mountphilips Substation, is presented in Table 4-1 below.

Table 4-1: Comparison of the Environmental Effects of Two Alternative Grid Technologies

Impact	Underground Cable in public roads	Overhead Line (cross country)
Biodiversity Habitat Loss, Disturbance and Displacement and Collision Risk to Birds and Bats.	**Context:** UGC construction and operation within the carriageway of public roads. **Low sensitivity of birds and bats to the UGC:** while birds and bats are protected by legislation and can be sensitive to habitat loss and disturbance, they are not considered to be vulnerable to works on the public road network due to location of UGC in built environments, and in the context of daily noise and human presence on public road. No vulnerability to the presence of operational underground cables. **Low Magnitude of change to birds and bats:** No habitat loss, and any disturbance would not be noticeable in practice in the context of works on public roads with daily noise and human presence. UGC has no operational collision or displacement impacts due to the underground nature of this type of grid connection technology. Result: **Imperceptible Negative**	**Context:** Overhead line across natural lands including agricultural and forestry lands. **Moderate sensitivity of Birds and Bats to the OHL** birds and bats are protected by legislation and are vulnerable to construction works on natural lands which can result in habitat loss and disturbance. Birds and bats can also be vulnerable to collision with overhead lines in natural landscapes. **Moderate Magnitude of change to birds and bats**: observable loss of habitat loss at structure locations and underneath the overhead lines (particularly felling of trees); which may be significant if habitat loss occurs in important foraging or breeding habitats. It is likely that observable disturbance and displacement of birds will occur, although this is generally mitigated by the short duration and linear nature of works. However effects could be significant should works occur in close proximity to sensitive species during key stages of their breeding cycle. Birds and bats could be significantly affected by the presence of overhead lines, particularly if these lines were routed across important feeding or migratory routes or core foraging areas. Result: **Moderate Negative**
Biodiversity Habitat Loss, Disturbance to Terrestrial Mammals	**Context:** UGC construction and operation within the carriageway of public roads. **Moderate sensitivity of terrestrial mammals to the UGC:** while terrestrial mammals are protected by legislation and can be affected by habitat loss and disturbance, they are not considered to be vulnerable to works on the public road network due to location of UGC in built environments, and in the context of daily noise and human presence on road.	**Context:** Overhead line across natural lands including agricultural and forestry lands. **High sensitivity of terrestrial mammals to the OHL:** terrestrial mammals are protected by national and international legislation and considered vulnerable to habitat loss and disturbance in natural environments.

Impact	Underground Cable in public roads	Overhead Line (cross country)
	Low Magnitude of change to Terrestrial Mammals: No habitat loss, and any disturbance would not be noticeable in practice in the context of works on public roads with daily noise and human presence. While internationally protected species such as Otter may occur near bridge crossing locations, any disturbance would be in the context of works on the public road network, which is already a source of noise and human presence.	**Low Magnitude of change to Terrestrial Mammals**: observable loss of habitat loss at structure locations and underneath the overhead lines (particularly felling of trees); which may be significant if habitat loss occurs in important foraging or breeding habitats, or if habitat fragmentation occurs as a result of forestry felling. It is likely that observable disturbance and displacement of mammals will occur during the construction stage, although this is generally mitigated by the short duration and linear nature of works. However effects could be significant should works occur in close proximity to highly sensitive species such as otter or badger during sensitive part of their breeding cycle.
	Result**: Imperceptible Negative**	Result**: Moderate Negative**
Biodiversity Reduction in Aquatic Habitat Quality, Disturbance of Fisheries	**Context:** UGC construction within the carriageway of public roads with existing watercourse crossing structures in place. No storage of excavations from road excavations with all excavations removed to waste facilities. **Moderate Sensitivity of Aquatic Habitat and Fisheries to the UGC** aquatic habitats and fisheries are protected by legislation, however it is considered that these receptors are less vulnerable to road works for UGC than for OHL, because works will take place from paved surfaces, with the capability to use existing watercourse crossing structures to cross watercourses. **Low Magnitude of change to Aquatic Habitats & Fisheries** - works will occur on public roads, the potential for sedimentation is reduced due to the location of the excavations – i.e. within road pavements, the movement of vehicles on road pavements rather than natural lands, and the removal of all excavated materials from the works locations. The requirement for instream works for UGC along a public road would also be minimal with sufficient coverage and structure integrity likely to be encountered at most locations. There is less potential to disturb fish species due to the availability of existing crossing structures.	**Context:** OHL construction on natural lands and likely to require new crossings of watercourses to provide access to at least some of the OHL support structures. Small excavations at the structure locations would be stored adjacent to works at least for a temporary duration. **High Sensitivity of Aquatic Habitat and Fisheries to the OHL**: aquatic habitats and fisheries are protected by legislation, and it is considered that these receptors are vulnerable to water quality impacts due to excavation works, storage of excavated materials and the presence of machinery in proximity to watercourses. Fish species are also vulnerable to disturbance where watercourse crossing works require instream works. **Moderate Magnitude of change to Aquatic Habitats & Fisheries** while aquatic habitats are likely to be avoided where possible, it is likely that due to the fact that the OHL will be constructed over c.30km of natural lands including c.70- 100 watercourses, that there will be works in close proximity to watercourses with new temporary/permanent watercourse crossings likely to be required to access at least some of the c.165 OHL support structures. There will also be small excavation volumes at structure locations, some of which are likely to be in close proximity to watercourses. There is a risk of sediment laden run off into adjacent watercourses as a result of construction works. Heavy machinery and vehicles will also be tracking over natural lands with a risk of soil erosion and subsequent sediment runoff. Sedimentation related impacts may persist until excavated/disturbed ground has vegetated. Fish

Impact	Underground Cable in public roads	Overhead Line (cross country)
		species may also be disturbed should instream crossing works occur during sensitive periods of their life cycle.
	Result: **Imperceptible Negative**	Result: **Moderate Negative**
Water Reduction in Surface water and Groundwater Quality	**Context:** UGC construction within the carriageway of public roads with existing watercourse crossing structures in place. No storage of excavations from road excavations with all excavations removed to waste facilities. **Moderate Sensitivity of Water to the UGC:** although water bodies are protected by legislation, it is considered that surface waters are less vulnerable to works on public roads for UGC because of the location of excavations within paved surfaces, and the capacity to use existing watercourse crossing structures, with minimum instream works required to install a UGC along public road. Groundwater, similarly, is not as vulnerable to excavations within road pavements, due to the smaller proportion of natural soils under roadways. **Low Magnitude of change to Water**: works will occur on public roads, the potential for sedimentation is reduced due to the location of the excavations – i.e. within road pavements, the movement of vehicles on road pavements rather than natural lands avoids the risk of addition soil erosion due to vehicular movements, and the removal of all excavated materials from the works locations also removes a main source of sediment from works locations. The requirement for instream works for UGC along a public road would also be minimal with sufficient coverage and structure integrity likely to be encountered at most locations. Effects to groundwater are minimised due to the location of excavations within paved road structures.	**Context:** OHL construction on natural lands and likely to require new crossings of watercourses to provide access to at least some of the OHL support structures. Small excavations at the structure locations would be stored adjacent to works at least for a temporary duration. **High Sensitivity of Water to the OHL**: waterbodies are protected by legislation, and it is considered that both surface waters and groundwater are vulnerable to excavation works, storage of excavated materials and the presence of machinery in natural lands and in proximity to watercourses. **Low Magnitude of change to Water**: due to the fact that the OHL will be constructed over c.30km of natural lands including c.70- 100 watercourses, that there will be works in close proximity to watercourses with new temporary/permanent watercourse crossings likely to be required to access at least some of the c.165 OHL support structures. There will also be small excavation volumes at structure locations, some of which are likely to be in close proximity to watercourse. There is a higher risk of sediment laden run off into adjacent watercourses as a result of construction works. Heavy machinery and vehicles will also be tracking over natural lands with a risk of soil erosion and subsequent sediment runoff. Sedimentation related impacts may persist until excavated/disturbed ground has vegetated. Groundwater may be affected by excavation works in natural lands. The magnitude of impact is reduced by the location of works across several catchments.
	Result: **Imperceptible Negative**	Result: **Moderate Negative**

Impact	Underground Cable in public roads	Overhead Line (cross country)
Landscape Reduction in Visual Amenity, Change in Landscape Character	**Context:** Underground cable constructed within the carriageway of public roads. **Low Sensitivity of the Landscape to the UGC**: although roads in the area are designated scenic routes, these routes are not considered vulnerable to UGC due to the underground nature of this grid connection technology. **No Magnitude of change to Landscape:** albeit that construction works will take place on scenic routes, these works will be similar to road works which are commonly encountered and will be temporary in duration, the long term operational impact will be negligible due to the underground nature of the UGC with manholes and marker plates as the only visible evidence of its presence. Result**: Neutral**	**Context:** Overhead line across natural lands including agricultural and forestry lands. **Moderate Sensitivity of Landscape to the OHL**: more vulnerable to OHL than UGC due to the tranquil nature with low intensity land uses of the upland landscape between the Upperchurch Windfarm and Mountphilips Substation, with views of the OHL likely from scenic routes along roads around the upland area. **Moderate Magnitude of change to Landscape**: While overhead electricity and telecom lines are generally commonplace in the countryside, the addition of new OHL infrastructure across this upland landscape would have an observable negative effect from scenic routes in the form of increased visual clutter. Result**: Moderate Negative**
Material Assets Damage to Public Roads, Increased Journey Times to Road Users	**Context:** UGC construction and operation within the carriageway of public roads. **Moderate Sensitivity of Material Assets (public road) to the UGC**: due to the value of public roads as transport routes for local and regional populations. **Moderate Magnitude of change to Material Assets (public road):** UGC will be wholly constructed within public pavements, which will extend for c.30km. Delays to Road Users due to road works, and road closures will have an observable temporary effect on people's daily lives and may impact daily routines during the construction phase, however the roads in the area are not congested. The magnitude of impact is mitigated through the temporary duration of works, and the reinstatement of public roads following the completion of works. **Result: Moderate Negative**	**Context:** Overhead line across natural lands including agricultural and forestry lands. **Low Sensitivity of Material Assets (public road and built services) to the OHL:** neither public roads nor road users are usually vulnerability to OHL works which take place at off-road locations, although some stringing of OHL will be required across public roads. **No Magnitude of change to Material Assets (public road):** no works on the road, stringing activities will not affect public road structures and any delays to road users during stringing activities will be negligible. **Result: Neutral**

4.3.4 Conclusion to Comparison of Alternative Grid Connection Technologies – OHL and UGC

Table 4-2 Summary Classification of Impacts – Alternative Grid Connection Technologies

Significance		Underground Cable in the Public Road Network	Overhead Line (Cross Country)
No impact/ Neutral Impact		- **Landscape:** Reduction in Visual Amenity, Change in Landscape Character.	- **Material Assets:** Damage to Public Roads, Increased Journey Times to Road Users.
Negative	**Imperceptible**	- **Biodiversity:** Habitat Loss, Disturbance and Displacement and Collision Risk to Birds and Bats. - **Biodiversity:** Habitat Loss, Disturbance to Terrestrial Mammals. - **Biodiversity:** Reduction in Aquatic Habitat Quality, Disturbance of Fisheries. - **Water:** Reduction in Surface Water and Groundwater Quality.	
	Slight	n/a	n/a
	Moderate	- **Material Assets:** Damage to Public Roads, Increased Journey Times to Road Users**.**	- **Biodiversity:** Habitat Loss, Disturbance and Displacement and Collision Risk to Birds and Bats. - **Biodiversity:** Habitat Loss, Disturbance to Terrestrial Mammals. - **Biodiversity:** Reduction in Aquatic Habitat Quality, Disturbance of Fisheries. - **Water:** Reduction in Surface Water and Groundwater Quality. - **Landscape:** Reduction in Visual Amenity, Change in Landscape Character.
	Significant	n/a	n/a
	Profound	n/a	n/a

Underground Cable: The results of the analysis of the environmental effects of an **Underground Cable (UGC)** ranged from **No Impact (for impacts to Landscape)** to **Imperceptible Negative (for impacts on Biodiversity and Water)** due to the location of the construction works being carried out within public roads with crossings structures in place, which avoids or minimises impacts such as habitat loss, disturbance, instream works and water quality impacts, and the location of the UGC technology underground which negates operational stage impacts such as collision risk and reductions in visual amenity and landscape character. More negative effects **(Moderate Negative)** are likely to **Material Assets** – *public roads and road users*, due to the location of the UGC construction works on public roads which would require the cutting and excavation of road pavements and would also cause some travel delays to road users, however any impacts would be temporary and reversible with reinstatement of roads following the completion of construction works.

Overhead Line: The results of the analysis of the environmental effects of an **Overhead Line (OHL)** ranges from **No Impact/Neutral Impact (for impacts to Material Assets** – *public roads and road users***)** due to absence of works on the public road; to more negative effects to **Biodiversity and Water (Moderate Negative**), due to the location of the OHL construction works on natural lands, with some habitat loss and disturbance expected, and due to the carrying out of works in close proximity to watercourses with some instream works likely to be required, the magnitude of impact is reduced by the location of works across several water catchments. Impacts to **Landscape** are also likely to be **Moderate Negative** due to the addition of new above ground structures across a rural and low intensity landscape, with structures visible from scenic routes.

Conclusion: Overhead Line technology will have minimal effect on Material Assets (public roads and road users), but because of the technical requirements of Overhead Line technology, the OHL would need to be routed through the open countryside, which places construction works within natural habitats including watercourses. Moderate negative effects could occur to Biodiversity and Water receptors as a result. Because of its above ground characteristics, moderate negative effects to Landscape could also occur in this rural setting.

On the other hand, although Underground Cable technology will have negative Moderate effects on Material Assets (public roads and road users); it is because of its location on public roads, that direct effects to natural habitats are avoided, and effects to animal species and watercourses are minimised.

Of the 2 no. alternative technologies, while neither technology was considered likely to cause significant effects, it was considered that OHL had more potential to cause significant effects to the natural environment. **When the emphasis is placed on the natural environment the use of underground technology (in public roads) is a better alternative than Overhead Line technology and therefore the underground cable alternative was chosen for the grid connection technology** to the connection Node prescribed in the Upperchurch Windfarm Grid Connection Agreement.

4.4 Alternatives Considered for the Mountphilips Substation

The Grid Connection Agreement for Upperchurch Windfarm requires that a new node is created by building a new 110kV substation at Mountphilips, under the existing Killonan - Nenagh 110kV overhead line.

The alternative locations and designs which were considered for the Mountphilips Substation are described in this section, together with a comparison of the environmental effects of these alternatives considered.

4.4.1 Alternative Locations for the new 110kV Substation

4.4.1.1 Description of Alternative Locations for the 110kV substation

Two alternative locations in the Mountphilips area were investigated, both locations were proximate to the existing Killonan - Nenagh 110kV line; were located outside of any Natura 2000 Sites; had suitable ground conditions (i.e. not peatland); had availability of lands; had sufficient distance from neighbouring dwellings to avoid any operational effects (such as noise); and had adequate screening to reduce visual impacts.

Two designs were considered - Gas Insulated Switchgear (GIS) and Air Insulated Switchgear (AIS); GIS substations have a smaller footprint but involve the location of the switchgear in a large deep underground room, whereas AIS substations involve larger compound areas but no requirement for underground switchgear rooms and therefore any excavations are shallow in nature.

The two locations, Site A and Site B, are both in agricultural grassland fields, with Site A on the western side of the OHL, and Site B on the eastern side of the OHL. Due to the size of the site at Site A, the design of the substation at Site A was based on a GIS substation. At Site B, because the site area was larger, the design of the substation compound could be either GIS or AIS.

Relevant Volume C3 EIAR Figures:

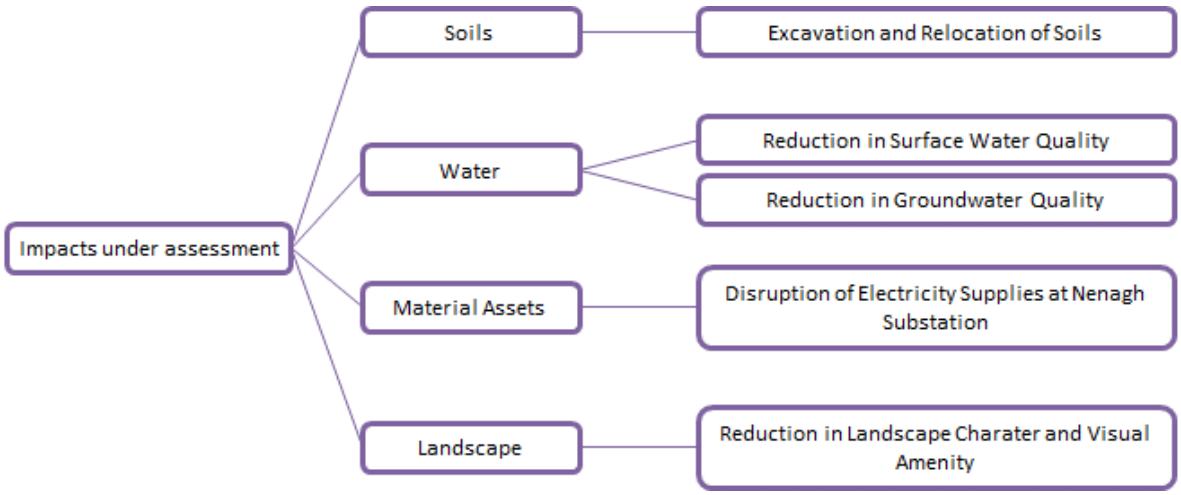
The location and layout of the three options is illustrated on Figure GC 4-1: Alternative Locations/Designs considered for the Mountphilips Substation

4.4.1.2 Comparison of the Environmental Effects of the Alternative Substation Locations

The comparison of the environmental effects of these 3 alternatives – GIS at Site A, GIS at Site B, AIS at Site B - uses the assessment methodology which was developed under the EU LIFE project IMPERIA. The IMPERIA methodology is described above in Section 4.3.3.1.

4.4.1.3 Potential Impacts of the Alternative Substation Locations

The 3 No. substation location/design options were investigated for potential for environmental effects. The environmental factor topics assessed and the impacts with potential for significant effect are set out in the Impact Tree below;



4.4.1.4 Comparison of the Environmental Effects on the Topics Chosen

A comparison of relevant environmental impacts of the three alternative substation location/design options, is presented in Table 4-3 below.

Table 4-3: Comparison of the Environmental Effects of 3 No. Alternative Substation Locations

IMPACT	GIS AT SITE A – WESTERN SIDE OF OHL, GIS DESIGN	GIS AT SITE B – EASTERN SIDE OF OHL, WITH GIS DESIGN	AIS SITE B – EASTERN SIDE OF OHL, WITH AIS DESIGN
Soils Excavation and Relocation of Soils	**Context:** Site investigations found firm ground and gentle evenly sloped topography. Longer access road to Site A from site entrance than Site B **Moderate Sensitivity** of Soils due to the moderate fertility of the soils, local value of the soils, but absence of peat, the soil is not unique and occurs abundantly in the area. **Moderate Magnitude** of change to Soils due to the moderate volumes of productive mineral soils and rock which would require to be permanently removed to construct the GIS substation and access road. Deeper excavations increase risk of contamination of soils.	**Context:** Site investigations found firm ground and flat topography. Shorter access road from site entrance to Site B. **Moderate Sensitivity** of Soils due to the moderate fertility of the soils, local value of the soils, but absence of peat, the soil is not unique and occurs abundantly in the area. **Moderate Magnitude** of change to Soils due to the moderate volumes of productive mineral soils and rock which would require to be permanently removed to construct the GIS substation and access road. Deeper excavations increase risk of contamination of soils.	**Context:** Site investigations found firm ground and flat topography. Shorter access road from site entrance to Site B. **Moderate Sensitivity** of Soils due to the moderate fertility of the soils, local value of the soils, but absence of peat, the soil is not unique and occurs abundantly in the area. **Low Magnitude** of change to Soils due to the moderate volumes of productive mineral soils and rock which would require to be permanently removed to construct the AIS substation and access road. However, all excavations will be shallow.
	Result: **Moderate Negative**	Result: **Moderate Negative**	Result: **Slight Negative**
Water Reduction in Surface Water and Groundwater	**Context:** A stream flows to the east of the OHL, gently sloping surface water and groundwater flowpaths into this stream from the substation compound area,	**Context:** A stream flows to the west of the substation compound, between the substation compound and the OHL, surface water and groundwater flowpaths over	**Context:** A stream flows to the west of the substation compound, between the substation compound and the OHL, surface water and groundwater flowpaths over

IMPACT	GIS AT SITE A – WESTERN SIDE OF OHL, GIS DESIGN	GIS AT SITE B – EASTERN SIDE OF OHL, WITH GIS DESIGN	AIS SITE B – EASTERN SIDE OF OHL, WITH AIS DESIGN
Quality	deeper excavations with greater potential for groundwater impacts, larger volumes of excavated material for GIS; requirement for new permanent watercourse crossing structure over this stream to provide construction and operational access to the substation.	flat topography into this stream from the substation compound area, deeper excavations with greater potential for groundwater impacts, larger volumes of excavated material for GIS; requirement for temporary watercourse crossing structure over the stream to provide construction access to the new end masts to be constructed under the OHL.	flat topography into this stream from the substation compound area, shallow excavations and slightly smaller volumes (overall) of excavated material for AIS; requirement for temporary watercourse crossing structure over the stream to provide construction access to the new end masts to be constructed under the OHL.
	Moderate Sensitivity of Water due to the Good WFD Status of the local stream, and the high local value, in the context of the occurrence of streams such as this in the surrounding area.	**Moderate Sensitivity** of Water due to the Good WFD Status of the local stream, and the high local value, in the context of the occurrence of streams such as this in the surrounding area.	**Moderate Sensitivity** of Water due to the Good WFD Status of the local stream, and the high local value, in the context of the occurrence of streams such as this in the surrounding area.
	Moderate Magnitude of change to Water: while standard construction methods and environmental protection measures will mitigate the magnitude of the effects to water quality, there is most potential risk associated with Site A than with Site B due to the large volumes of excavated material and the sloping flowpaths from Site A into the local stream. The presence of deep excavations, greater potential for dewatering, increases risks to groundwater. This option also requires a permanent crossing/road over the local stream.	**Moderate to Low Magnitude** of change to Water: while standard construction methods and environmental protection measures will mitigate the magnitude of the effects to water quality, there is more potential risk associated with this GIS option at Site B than the AIS option at Site B due to the presence of large volumes of excavated material, which is mitigated by the flat topography at Site B. The presence of deep excavations, greater potential for dewatering, increases risks to groundwater. This option only requires a temporary crossing of the local stream.	**Low Magnitude** of change to Water: slightly smaller volumes of excavated materials, flat topography and shallow excavations, along the standard construction methods and environmental protection measures will mitigate the magnitude of the effects to water quality. This option only requires a temporary crossing of the local stream.
	Result: **Moderate Negative**	Result: **Moderate Negative**	Result: **Slight Negative**

IMPACT	GIS AT SITE A – WESTERN SIDE OF OHL, GIS DESIGN	GIS AT SITE B – EASTERN SIDE OF OHL, WITH GIS DESIGN	AIS SITE B – EASTERN SIDE OF OHL, WITH AIS DESIGN
Material Assets Disruption of Electricity Supplies at Nenagh Substation	**Context:** Construction works on the substation cannot be carried out safely due to the proximity of the operating Killonan – Nenagh OHL and therefore switch out during construction would be required. **High sensitivity** of the Material Asset: due to the regional importance of the OHL between Killonan and Nenagh, being a main supply of electricity into Nenagh town and surrounding area. **High Magnitude** of change to Material Asset: due to the close proximity of the substation compound to the OHL, the line between Killonan and Nenagh will be de-energised and switched out for c.6months. While electricity can be backfed to Nenagh from other parts of the network, the length of the outage presents a major risk of shortages in electricity supply at Nenagh and a substation at this location would trigger realignments of the overhead line to avoid such a long outage of the 110kV overhead line supply into Nenagh. Result: **Significant Negative**	**Context:** Construction works on the substation can be carried out at a sufficiently safe working distance from the operating Killonan – Nenagh OHL which means that the OHL does not need to be switched out during the construction work. **High sensitivity** of the Material Asset: due to the regional importance of the OHL between Killonan and Nenagh, being a main supply of electricity into Nenagh town and surrounding area. **No Magnitude** of change to Material Asset**:** construction of the substation will not require electricity outages of c.6months. Commissioning of the substation and final connection to the line will require an outage of c.4 days. During the commissioning of the new Mountphilips Substation, the line between Killonan and Nenagh will be de-energised and switched out. This is unlikely to have any effect on supply into Nenagh. Result**:** **Neutral Impact**	**Context:** Construction works on the substation can be carried out at a sufficiently safe working distance from the operating Killonan – Nenagh OHL which means that the OHL does not need to be switched out during the construction work. **High sensitivity** of the Material Asset: due to the regional importance of the OHL between Killonan and Nenagh, being a main supply of electricity into Nenagh town and surrounding area. **No Magnitude** of change to Material Asset**:** construction of the substation will not require electricity outages of c.6months. Commissioning of the substation and final connection to the line will require an outage of c.4 days. During the commissioning of the new Mountphilips Substation, the line between Killonan and Nenagh will be de-energised and switched out. This is unlikely to have any effect on supply into Nenagh. Result**:** **Neutral Impact**
Landscape Reduction in Landscape Character and Visual Amenity	**Context:** Site A is slightly more elevated location than Site B, although still considered low lying, five fields in from the public road, Site A is surrounded by high tree-lined hedgerows, substation comprises bulky GIS building	**Context:** Site B is a low-lying location, four fields in from the local road, Site B is surrounded by high tree-lined hedgerows, substation comprises bulky GIS building	**Context:** Site B is a low-lying location, four fields in from the local road, Site B is surrounded by high tree-lined hedgerows, substation comprises small control building and discrete AIS structures

IMPACT	GIS AT SITE A – WESTERN SIDE OF OHL, GIS DESIGN	GIS AT SITE B – EASTERN SIDE OF OHL, WITH GIS DESIGN	AIS SITE B – EASTERN SIDE OF OHL, WITH AIS DESIGN
	Moderate to High Sensitivity of Landscape: Site A is located in the lowland area contained within 'LCA12 River Shannon – Newport', with a Moderate-High Sensitivity. **Moderate Magnitude** of change to the Landscape: The substation will result in an increase in the amount of above-ground built development, which will be slightly more noticeable in than Site B, however screening will limit its visibility.	**Moderate to High Sensitivity** of Landscape: Site B is located in the lowland area contained within 'LCA12 River Shannon – Newport', with a Moderate-High Sensitivity. **Low Magnitude** of change to the Landscape: The substation will result in an increase in the amount of above-ground built development, which will be noticeable in this rural setting, but screening will minimise its visibility.	**Moderate to High Sensitivity** of Landscape: Site B is located in the lowland area contained within 'LCA12 River Shannon – Newport', with a Moderate-High Sensitivity. **No Magnitude** of change to the Landscape: Due to the screening, low lying location and discrete character of AIS substation structures, the addition of the new AIS substation will be barely noticeable at this location.
	Result: **Slight Negative**	Result: **Slight Negative**	Result: **Neutral Impact Negative**

4.4.2 Conclusion to Comparison of Alternatives for the Mountphilips Substation

Table 4-4 Summary Classification of Impacts – Alternatives considered for the Mountphilips Substation

Significance		GIS AT SITE A – WESTERN SIDE OF OHL, GIS DESIGN	GIS AT SITE B – EASTERN SIDE OF OHL, WITH GIS DESIGN	AIS SITE B – EASTERN SIDE OF OHL, WITH AIS DESIGN
No impact/ Neutral Impact			- **Material Assets:** Disruption of Electricity Supplies at Nenagh Substation	- **Material Assets:** Disruption of Electricity Supplies at Nenagh Substation - **Landscape:** Reduction in Landscape Character and Visual Amenity
Negative	**Imperceptible**			
	Slight	- **Landscape:** Reduction in Landscape Character and Visual Amenity	- **Landscape:** Reduction in Landscape Character and Visual Amenity	- **Soils:** Excavation and Relocation of Soils - **Water:** Reduction in Surface Water and Groundwater Quality
	Moderate	- **Soils:** Excavation and Relocation of Soils - **Water:** Reduction in Surface Water and Groundwater Quality	- **Soils:** Excavation and Relocation of Soils - **Water:** Reduction in Surface Water and Groundwater Quality	
	Significant	- **Material Assets:** Disruption of Electricity Supplies at Nenagh Substation		
	Profound			

GIS at Site A *(western side of the OHL)* The results of the analysis of the environmental effects of the location of the **new GIS substation at Site A,** ranges from **Slight Negative (Landscape)** due to its relatively low lying location and screening from surrounding hedgerows; to **Moderate Negative (Soils and Water)** due to the requirement for deep excavations, resultant moderate volumes of excavated material and short sloping flowpaths to the local stream, in addition to the requirement for a new permanent crossing of this stream. **Significant Negative (Material Assets)** due to the requirement for outages of the Killonan to Nenagh 110kV OHL for a period of c.6months, while the OHL is not the only source of electricity into Nenagh town and surroundings, it is the main source, and an outage of this length presents a serious risk of electricity supply interruption in the Nenagh area.

GIS at Site B *(eastern side of the OHL)* The results of the analysis of the environmental effects of the location of the **new GIS substation at Site B,** ranges from **Neutral (Material Assets)** the very short duration of outages of the OHL – c.4 days with no impact likely on electricity supply into Nenagh; to **Slight Negative (Landscape)** due to the addition of new bulky building which would be mitigated by the low lying location and screening from surrounding hedgerows; to **Moderate Negative (Soils and Water)** due to the requirement for deep excavations, resultant moderate volumes of excavated material and flatter topography for flowpaths to the local stream.

AIS at Site B *(eastern side of the OHL)* The results of the analysis of the environmental effects of the location of the **new GIS substation at Site B,** ranges from **Neutral (Material Assets and Landscape)** due to the very short duration of outages of the OHL – c.4 days with no impact likely on electricity supply into Nenagh; and the discrete nature of the AIS structures which would be barely noticeable in the surrounding area; to **Slight Negative (Soils and Water)** due to no requirement for deep excavations – all excavations will be shallow, and flatter topography for flowpaths to the local stream.

Of the 3 no. alternatives for Mountphilips Substation – GIS on the western side of the OHL, GIS on the eastern side of the OHL or AIS on the eastern side of the OHL; GIS on the western side of the OHL is likely to cause significant effects due to the requirement for outages of the Killonan to Nenagh 110kV OHL for a period of c.6months, while the OHL is not the only source of electricity into Nenagh town and surroundings, it is the main source, and an outage of this length presents a serious risk of electricity supply interruption in the Nenagh area, and is not considered to be acceptable. While neither design at Site B is likely to cause significant effects, **when the emphasis is placed on the natural environment** it was considered that 'AIS at Site B' had least potential to cause significant effects to the natural environment due to the much smaller size of buildings within the substation compound and the shallow depth of excavations, **and therefore 'AIS at Site B' was chosen for the location and design of the Mountphilips Substation**.

4.5 Alternative Grid Connection UGC Routes along the Public Road

4.5.1 Description of the Alternative UGC Routes

According to the Grid Connection Agreement secured for Upperchurch Windfarm, the connection point for Upperchurch Windfarm is at a new node to be built on the existing Killonan to Nenagh 110kV overhead line, c.24km west of the windfarm substation and the connection method is by underground cable (UGC).

In consideration of the comparison of the alternative grid connection technologies (i.e. UGC in the public road v OHL cross country) as set out in the previous section, an underground cable along the public road (which is the method stipulated in the Grid Connection Agreement) is the preferred grid connection technology.

Three possible alternative UGC public road routes were considered.

All three routes run (east to west) from the Consented Upperchurch Windfarm Substation in Knockcurraghbola Commons along a private paved road for 700m; then for 300m on the L6188-0; and then for 1.9km on the L2264-50, as far as the junction with the Thurles to Limerick Regional Road (R503) at Knockmaroe townland. The UGC for all 3. No. routes then follows the R503 for 12.7km as far as Rear Cross, approximately half way along the route.

There are 3 No. alternative public road routes for the 2nd half of the route i.e. from Rear Cross on the R503, to Coole Crossroads on the L2166-10, 730m south of the proposed Mountphilips Substation Entrance. The 3 No. alternative routes from Rear Cross to Coole Crossroads are;

1. **Local Roads (through Toor):** From Rear Cross, turning north onto the Local Road Network (L2114-0) and then in a westerly direction through Toor, avoiding Newport Town using the Local Road Network of the L2157-5, L2157-0, L5183-0 and L6013-0 to Coole Crossroads.
2. **R503 (through Newport Town):** Continuing west from Rear Cross on the R503, through Newport Town and then north on the L2166-0 to Coole Crossroads.
3. **R503 (avoiding Newport Town):** Continuing west from Rear Cross on the R503 and turning north onto the L6009-0 at the GAA grounds outside Newport Town and using the Local Road Network (L6009-0), thus avoiding Newport by using the Local Road Network of the L2157-0, L2156-0and L6013-0 to Coole Crossroads.

The following similarities apply to all 3 No. routes:

- The UGC on all 3 No. routes on the public road, can be laid entirely under the road pavement. All routes will require a single lane and/or full road closures during the works.
- An UGC comprises a trench c.1.25m deep and 0.6m wide, laid with 5 cable ducts and with joint bay and communications chamber points located at regularly intervals along the route. Following reinstatement of the road, the only surface expression of an UGC is the manhole type covers over the Joint Bay locations and the over-ground identification marker posts and plates along the route.
- All three routes pass through the boundaries of the Slievefelim to Silvermines Mountains SPA and the Lower River Shannon SAC. All routes are mainly located in the regional Lower River Shannon & Mulkear catchment area.
- Habitats on either side of the roads on all routes are broadly similar and comprise a mix of forestry of varying age classes, improved agricultural grassland and rough grazing.

Relevant Volume C3 EIAR Figures:

Figure GC 4-2: Alternative Routes considered for the 110kV UGC from Rear Cross to Coole Crossroads

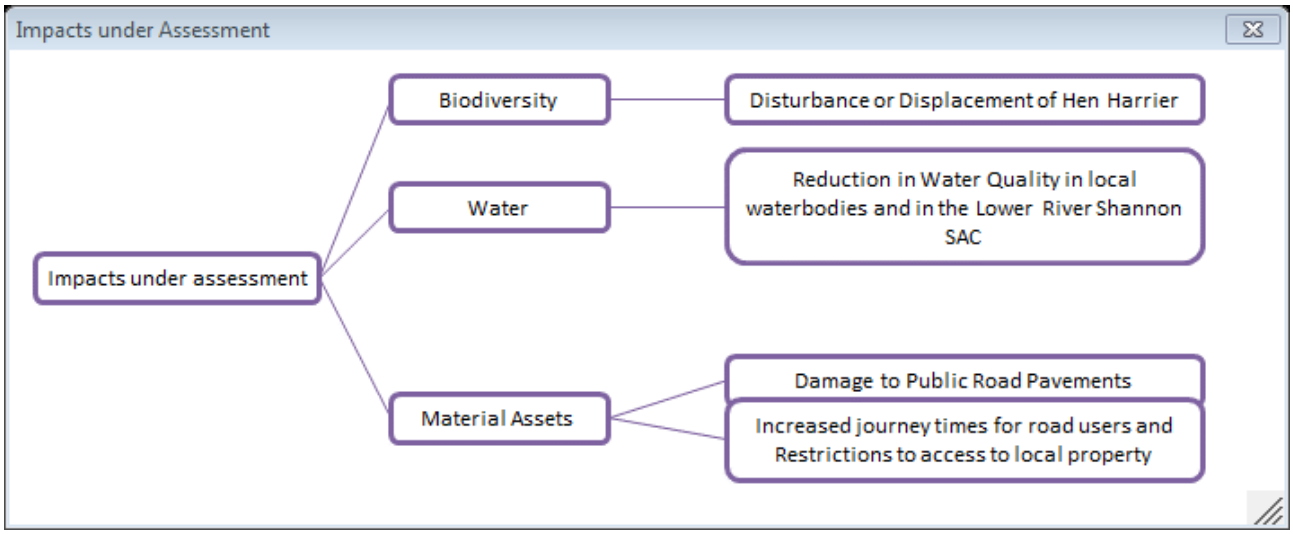
4.5.1 Comparison of the Environmental Effects of the Alternative UGC Routes

The comparison of the environmental effects of the alternative UGC routes uses the assessment methodology which was developed under the EU LIFE project IMPERIA. The IMPERIA methodology is described above in Section 4.3.3.1.

4.5.1.1 Potential Impacts of the Alternative UGC Routes along the Public Road

The 3 No. public road routes were investigated for potential for environmental effects, particularly on biodiversity. Investigations included site visits by Inis Consultants (Biodiversity), Hydro Environmental Services (Water) and TLI Group (Material Assets).

The environmental factor topics assessed and the impacts with potential for significant effect are set out in the Impact Tree below;



4.5.1.2 Comparison of the Environmental Effects on the Topics Chosen

A comparison of relevant environmental impacts of the three alternative UGC routes along the public road network from Rear Cross on the Regional Thurles to Limerick Road (R503) to Coole Crossroads c.18km to the west, is presented in Table 4-5 below.

Table 4-5: Comparison of the Environmental Effects of 3 No. Alternative UGC Routes

IMPACT	LOCAL ROADS (THROUGH TOOR)	R503 (THROUGH NEWPORT TOWN)	R503 (AVOIDING NEWPORT TOWN)
Biodiversity Disturbance and/or Displace-ment of Hen Harrier	**Context:** UGC construction and operation within the pavement of the local public road. c.6.2km of the UGC route from Rear Cross to Coole traverses the Slieve Felim to Silvermines SPA. The UGC is along a Local Road where it overlaps the SPA boundary. These roads are very lightly trafficked and the area is sparsely populated. Quiet anthropological setting. **High Sensitivity** of the species to the UGC: Protection of the species is highly regulated particularly within the SPA. **Low to Moderate Magnitude of change to Hen Harrier:** the route is through a sparsely populated area and the local road network is very lightly trafficked *(Annual Average Daily Traffic (AADT) on the Local Roads (through Toor) route is c.160 vehicles)*, overall this route is through a quieter area than the R503 options. There is potential for disturbance/displacement to hen harrier in the SPA due to the presence of works and personnel on the roads, and it is considered that construction activity levels will contrast with existing baseline conditions. There is no potential for direct habitat loss due to the location of works entirely on the public road network. Result**: Moderate Negative**	**Context:** UGC construction and operation within the pavement of the public road. c.4.9km of the UGC route from Rear Cross to Coole traverses the Slieve Felim to Silvermines SPA. The UGC is along a Regional Road where it overlaps the SPA boundary. Higher traffic volumes, higher number of houses and development along the route, busier anthropological setting **High Sensitivity** of the species to the UGC: Protection of the species is highly regulated particularly within the SPA **Low Magnitude of change to Hen Harrier:** the route is along a regional road connecting Thurles to Limerick and Newport to Cappamore, traffic and activity levels are much higher than through Toor due to the location on a regional road (*AADT on the R503 Regional Road between Rearcross and Derryleigh is 18 times higher than the Toor route at c.2860 vehicles*). There are more houses and development along the R503, than elsewhere in the SPA. Therefore in relation to disturbance/ displacement effects, it is considered that construction activity levels would not significantly contrast with existing baseline conditions with regional traffic volumes and many houses adjoining the road. Similar to the Toor route, there is no potential for direct habitat loss due to the location of the works entirely on the public road network. Result**: Imperceptible Negative**	**Context:** UGC construction and operation within the pavement of the public road. c.4.9km of the UGC route from Rear Cross to Coole traverses the Slieve Felim to Silvermines SPA. The UGC is along a Regional Road where it overlaps the SPA boundary. Higher traffic volumes, higher number of houses and development along the route, busier anthropological setting. **High Sensitivity** of the species to the UGC: Protection of the species is highly regulated particularly within the SPA **Low Magnitude of change to Hen Harrier:** the route is along a regional road connecting Thurles to Limerick and Newport to Cappamore, traffic and activity levels are much higher than through Toor due to the location on a regional road (*18 times higher traffic volumes than the Toor route*). There are more houses and development along the R503, than elsewhere in the SPA. Therefore in relation to disturbance/ displacement effects, it is considered that construction activity levels would not significantly contrast with existing baseline conditions with regional traffic volumes and many houses adjoining. Similar to the Toor route, there is no potential for direct habitat loss due to the location of the works entirely on the public road network. Result: **Imperceptible Negative**

IMPACT	LOCAL ROADS (THROUGH TOOR)	R503 (THROUGH NEWPORT TOWN)	R503 (AVOIDING NEWPORT TOWN)
Water Reduction in Water Quality in local waterbodies and in the Lower River Shannon SAC	**Context:** Located in the regional Mulkear River catchment. Passes through the following Local Surface Water Bodies (LSWBs); Clodiagh River, Bilboa River, Clare River, Small River and Newport (Mulkear) River catchments. The surface water quality in the LSWBs is typically at least "Good Status". A large proportion of the route (12-13km) runs close to the SAC (within 300 - 400m) with effectively zero downstream distance. **High Sensitivity** of the SAC to the UGC: Due to highly regulated receptor nearby (SAC) and proximity of the works and direct water pathways to the receptor. However works will be temporary; carried out over several LSWBs; and standard works methodologies and appropriate environmental protection measures will mitigate potential for effects of surface water run-off and pumped water. **Low Magnitude of change to the SAC:** Although a large proportion of the route drains directly into the SAC allowing effectively no potential for dilution of potential contaminants, standard construction methods and environmental protection measures will mitigate the magnitude of the effects of water run-off.	**Context:** Located in the regional Mulkear River catchment. Passes through the following Local Surface Water Bodies (LSWBs; Clodiagh River, Bilboa River, Clare River, Small River and Newport (Mulkear) River catchments. The surface water quality in the LSWBs is typically at least "Good Status". The majority of the Lower River Shannon SAC is more than 1km downstream of works on the R503. **Low Sensitivity of the SAC to the UGC:** Due to highly regulated receptor nearby (SAC) but reduced vulnerability due to a separation distance to the SAC of at least 1km from the majority of the works, in addition to the temporary duration of works and the location of works within public roads, spread over several local surface waterbodies. **Low Magnitude of change to the SAC:** Standard construction methods and environmental protection measures will mitigate potential for effects of surface water run-off and pumped water.; increased separation distance from the SAC will dilute/mitigate the magnitude of the effects further	**Context:** Located in the regional Mulkear River catchment. Passes through the following Local Surface Water Bodies (LSWBs; Clodiagh River, Bilboa River, Clare River, Small River and Newport (Mulkear) River catchments. The surface water quality in the LSWBs is typically at least "Good Status". The majority of the Lower River Shannon SAC is more than 1km downstream of works on the R503. **Low Sensitivity of the SAC to the UGC:** Due to highly regulated receptor nearby (SAC) but reduced vulnerability due to a separation distance to the SAC of at least 1km from the majority of the works, in addition to the temporary duration of works and the location of works within public roads, spread over several local surface waterbodies. **Low Magnitude of change to the SAC:** Standard construction methods and environmental protection measures will mitigate potential for effects of surface water run-off and pumped water.; increased separation distance from the SAC will dilute/mitigate the magnitude of the effects further
	Result: **Moderate Negative**	Result: **Imperceptible Negative**	Result: **Imperceptible Negative**

IMPACT	LOCAL ROADS (THROUGH TOOR)	R503 (THROUGH NEWPORT TOWN)	R503 (AVOIDING NEWPORT TOWN)
Material Assets Damage to Public Road Pavements	**Context:** Trench in Local Roads from Rear Cross to Coole Crossroads. Existing pavement condition indicating poor load spreading ability and moderate to weak subgrade. Unmarked carriageway up to 3.5m in width. Water services in the road network. **Moderate Sensitivity** of the Road Pavement to the UGC**:** while the local roads through Toor would not carry as high a societal value, due to their poor condition they are likely to be more vulnerable to damage during construction works. **Low Magnitude** of change to the road pavement: because the impact will be confined to the road pavement, road opening will be temporary and carried out in a linear fashion with each section temporarily reinstated before the following section is commenced. The full road will be fully reinstated to former or better condition. Result: **Slight Negative**	**Context:** Trench in Regional Road R503 from Rear Cross; through Newport Town and then in the Local Road to Coole Crossroads. Pavement condition of R503 is good. Road width up to 6m. Only water services in the R503 – no gas pipes, occasional underground electrical cables connecting into roadside homes. Underground services in the public road through Newport Town include gas, telecoms, electricity, sewage and storm water drains. **High Sensitivity** of the Road Pavement to the UGC: the R503 and particularly through Newport Town has high economic value. Tipperary County Council have pavement refurbishment works planned for 2019 for Newport Town. **Low Magnitude** of change to the road pavement: because the impact will be confined to the road pavement, road opening would be temporary and carried out in a linear fashion with each section temporarily reinstated before the following section is commenced. The road would be reinstated to former or better condition. However the works may happen after Tipperary County Council's planned pavement refurbishment works in Newport Town in 2019. Result: **Moderate Negative**	**Context:** Trench in Regional Road R503 from Rear Cross and avoiding Newport Town by using Local Roads to the north and north west of the town. Pavement condition is good on the R503 and poor on the Local Roads. Only water services in the R503 and on the local roads – no gas pipes, occasional underground electrical cables connecting into roadside homes. **Moderate Sensitivity** of the Road Pavement to the UGC: due to the high societal value of the R503. **Low Magnitude of change to the road pavement:** because the impact would be confined to the road pavement, road opening would be temporary and carried out in a linear fashion with each section temporarily reinstated before the following section is commenced. The road would be reinstated to former or better condition Result: **Imperceptible Negative**

IMPACT	LOCAL ROADS (THROUGH TOOR)	R503 (THROUGH NEWPORT TOWN)	R503 (AVOIDING NEWPORT TOWN)
	Context: Because of the width of the Local Roads, cabling works would require the most road closures of the three options. Alternative routes are available, albeit longer, and local access would be accommodated.	**Context:** On the R503, single lane closures only would be required and traffic can be managed to maintain good traffic flow. Alternative routes around Newport available. Otherwise, route includes lightly traffic sections of the R503 with adequate available capacity. Traffic through Newport Town would be disrupted for c.1 month during the cabling works.	**Context:** On the Local Road section, cabling works would require some road closures and these are lightly trafficked with available capacity on all roads. Alternative routes available and local access can be accommodated. On the R503, single lane closures only will be required and traffic can be managed to maintain good traffic flow. Otherwise, route includes lightly traffic sections of the R503 with adequate available capacity.
Material Assets: Increased journey times for road users and restrictions to access to local property	**Low Sensitivity** of Road Users to the UGC: because although road closures would be required the number of people affected would be very Low.	**Moderate Sensitivity** of Road Users to the UGC: high number of road users in Newport town in particular, and also along the R503, in the context of lower vulnerability to change due to wider nature of the roads with single lane closures rather than road closures being required.	**Low Sensitivity of Road Users to the UGC:** The R503 and the wider local roads will only require one-lane closures to accommodate the works. On the narrower Local Roads, although road closures will be required, local access will be maintained.
	Moderate Magnitude of change to Road Users: Road closures would be in place for a number of months, however the numbers of people affected would be low and the impact would be reversible on completion of the works. Alternative routes available, albeit these routes are significantly longer.	**Moderate Magnitude** of change to Road Users: Although the impact will be temporary, traffic disruption would affect people and businesses in Newport Town, during the cabling works.	**Low Magnitude of change to Road Users:** On Local Roads, road closures would be short (c.1 to 2 weeks on any road) and would not impact on many people, with acceptable alternative routes available. Effects to Road Users on the R503 would be observable but the change in journey times would be negligible.
	Result: **Imperceptible Negative**	Result: **Moderate Negative**	Result: **Imperceptible Negative**

4.5.2 Conclusion to Comparison of Alternative UGC Routes in the Public Road

Table 4-6 Summary Classification of Impacts – Alternative UGC Routes

Significance		LOCAL ROADS (THROUGH TOOR)	R503 (THROUGH NEWPORT TOWN)	R503 (AVOIDING NEWPORT TOWN)
	No impact/ Neutral Impact			
Negative	**Imperceptible**	- **Material Assets:** Increase journey times for road users and restrictions to access to local property	- **Biodiversity:** Disturbance and/or Displacement of Hen Harrier - **Water:** Reduction in Water Quality in local waterbodies and in the Lower River Shannon SAC	- **Biodiversity:** Disturbance and/or Displacement of Hen Harrier - **Water:** Reduction in Water Quality in local waterbodies and in the Lower River Shannon SAC - **Material Assets:** Damage to Public Road Pavements - **Material Assets:** Increase journey times for road users and restrictions to access to local property
	Slight	- **Material Assets:** Damage to Public Road Pavements		
	Moderate	- **Biodiversity:** Disturbance and/or Displacement of Hen Harrier - **Water:** Reduction in Water Quality in local waterbodies and in the Lower River Shannon SAC	- **Material Assets:** Damage to Public Road Pavements - **Material Assets:** Increase journey times for road users and restrictions to access to local property	
	Significant			
	Profound			

Local Roads (through Toor)

The results of the analysis of the environmental effects of the Local Roads (through Toor) route ranges from **Imperceptible Negative** to **Moderate Negative.** Impacts to **Public Roads and Road Users** are likely to be **Imperceptible Negative** and **Slight Negative**, respectively, due to the lightly trafficked nature of the road and the capacity to repair any damage to the local roads with reinstatement following construction works. Impacts to **Biodiversity and Water** are likely to be **Moderate Negative** due to higher potential for disturbance/displacement of hen harrier from increased activity from the construction works which will contrast with existing quiet baseline condition on the 6.1km of a quiet Local Road traversing through a sparsely populated part of the SPA. Potential for moderate impacts to water quality in the SAC due to the near proximity of the works and direct water pathways to the Lower River Shannon SAC, although standard water protection measures as part of construction works will reduce the potential for effects.

R503 (through Newport Town)

The results of the analysis of the environmental effects of the R503 (through Newport Town) route ranges from **Imperceptible Negative to Moderate Negative.** Impacts to **Biodiversity and Water** are likely to be **Imperceptible Negative** due to lower potential for disturbance/displacement of hen harrier from increased activity from the construction works which will not contrast significantly with existing baseline condition on a busier regional road through a populated part of the SPA. Potential for impacts to water quality in the SAC is reduced due to distance of 1km of the SAC from the majority of the works. Impacts to **Public Roads and Road Users** is likely to be **Moderate Negative** due to the high value of the regional road, the larger number of Road Users which could be affected, and the potential effects on the planned pavement works by Tipperary County Council, particularly in Newport Town.

R503 (avoiding Newport Town)

The results of the analysis of the environmental effects of the R503 (avoiding Newport Town) route is likely to be **Imperceptible Negative** for **Biodiversity, Water, Public Roads and Road Users**. Impacts to Biodiversity (hen Harrier) is likely to be **Imperceptible Negative** due to lower potential for disturbance/displacement of hen harrier from increased activity from the construction works which will not contrast significantly with existing baseline condition on a busier regional road through a populated part of the SPA. Impacts to Water and water quality in the SAC is likely to be **Imperceptible Negative** due to distance of at least 1km of the SAC from the majority of the works, due to the poor quality of the existing road pavement and lightly trafficked nature of the Local Road; and the adequate carrying capacity of the R503. Impacts to **Public Roads and Road Users** are likely to be **Imperceptible Negative** due to the capacity to keep one lane of the R503 and the wider local roads open during works, the short duration of any road closures (1 to 2 weeks) on the narrower local roads and the reversibility of any impacts to road pavements with reinstatement following construction works.

Although **none of the Public Road route options are likely to have a significant effect on Biodiversity or Water**, when the emphasis is placed on biodiversity matters in this particular examination (the 3 No. alternative public road routes), either of the 'R503 routes' are preferable to the 'Local Road route through Toor' route, when the Hen Harrier species and the SAC is considered. When the effects on Material Assets are also taken into account, the R503 (avoiding Newport Town) is the best alternative. **Therefore the R503 (avoiding Newport Town) route alternative was chosen for the UGC route to the new station node at Mountphilips.**

Relevant Volume C3 EIAR Figures:

Figure GC 4-2: Alternative Routes considered for the 110kV UGC from Rear Cross to Coole Crossroads

4.6 Alternative Process

Within each design solution there can be a number of alternatives as to how the processes or activities of the development can be carried out e.g. the management of processes that affect the volumes and characteristics of emissions or traffic. Consideration of alternative process at the earlier stages in the evolution of a project is an effective way of avoiding adverse effects on the environment.

An examination of the processes associated with the project, by the Design and EIAR evaluation teams, resulted in alternative processes being devised to avoid, prevent or reduce environmental effects. These alternative processes are an intrinsic part of the design of the UWF Grid Connection project.

These alternative processes are listed and compared in Table 4.7 below.

Table 4-7: Alternative Processes introduced as part of the project design

Environmental Factor	Potential Significant Negative Effect	Alternative Process and Comparison of Environmental Effect
Air & Human Health (Local Residents)	Dust and noise from construction works and machinery	The Process: Construction works for various elements of the Whole UWF Project taking place at the same time. Alternative Process: Construction works in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m. *(This process forms Project Design Measures PD11, See Chapter 5, Section 5.2.3)* 110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads. *(This process forms Project Design Measures PD07, See Chapter 5, Section 5.2.3)* Comparison: This timing of works will prevent significant cumulative effects to Air (Local Residents & Community), due to noise and dust from more than one source of construction works, that may have arisen should the works take place at the same time.
Water *(In this EIA Report Class 1 and Class 2 watercourses are watercourses which contain habitats suitable for fish and*	In-combination sedimentation effects to Water	The Process: Watercourse crossing works, earthworks, dewatering and excavation dewatering taking place, potentially at the same time, within 50m of a watercourse. Alternative Process: 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,

Environmental Factor	Potential Significant Negative Effect	Alternative Process and Comparison of Environmental Effect
aquatic species, such as streams and rivers. Drains, on the other hand are generally classified as Class 3 and Class 4 watercourses, which means that they no fisheries value).		excavation dewatering or culvert replacement works), to be carried out within 50m a watercourse, at any one time. *(This process forms Project Design Measures PD26, See Chapter 5, Section 5.2.3)* Comparison: This management of works will avoid the potential for localised in-combination effects on surface water quality which could occur should all of the main potential sediment sources occur in close proximity of a watercourse at the same time. Carrying out these sources (activities) separately both reduces the risk of impacts occurring, and also makes management of each of the activities easier in order to ensure no significant effects occur.
Biodiversity (Hen Harrier)	Disturbance	The Process: Application of standard mitigation measures as per Scottish Natural Heritage Guidance 2017 – i.e. 'No construction works to be carried out within 500m of a hen harrier nest during the breeding season (March to August inclusive)'. Alternative Process: - UWF Grid Connection construction works during the Hen Harrier breeding season (March to August inclusive) will only take place at the Mountphilips Substation Site; construction of the 110kV UGC between the Mountphilips Substation site and the Consented UWF Substation compound will be carried out during the months of September to February inclusive. *(This process forms Project Design Measures PD01, See Chapter 5, Section 5.2.3)* - If works at Mountphilips Substation site are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory Hen Harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the entire construction works area boundary. These surveys will be completed prior to the start-up of all construction activities. No works will take place within 2 km of any identified active Hen Harrier nest during the hen harrier breeding season. *(This process forms Project Design Measures PD02, See Chapter 5, Section 5.2.3)* Comparison: While the SNH guidance of 500m will make an disturbance to breeding hen harrier unlikely, the application of the alternative process for UWF Grid Connection (via PD01 and PD02) removes any potential for disturbance or displacement impacts and effectively puts constructions during the breeding season beyond 4km of known hen harrier nests.
Biodiversity (Bats)	Disturbance effects	The Process: Security lighting at the construction works area at Mountphilips Substation Compound and the Temporary Compound overnight for security, with motion sensor lights at the substation compound during operation. Construction working

Environmental Factor	Potential Significant Negative Effect	Alternative Process and Comparison of Environmental Effect
		hours during the standard 7am to 7pm regardless of the time of year, therefore requirement for lighting at works areas during the period October to March. Alternative Process: Security lighting will still be used, however: - All construction works will be carried out during daylight hours. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational. *(This process forms Project Design Measures PD63, See Chapter 5, Section 5.2.3)* Comparison: Cowling and controlling the direction and the duration of lighting better mitigates the disturbance effect to Bats during the controlled lighting times. The restriction of working hours to daytime hours means that there will be no requirement for lighting at works areas, and thereby will avoid disturbance effects to foraging bats.

4.7 'Do-Nothing' Alternative

The 'do-nothing' alternative examines trends currently occurring in the environment and the effects caused by not proceeding with the development.

The subject application comprises the grid connection for Upperchurch Windfarm, therefore the 'do nothing' scenario of UWF Grid Connection not being developed is the secondary impact of Upperchurch Windfarm not being developed.

From an economical point of view (with increases in wealth a determinant of better health), the 'do nothing' scenarios also represents a 'lost opportunity cost' to the economy, both at local and county level. Should the Upperchurch Windfarm project not be developed, the following positive long term economic gain locally during the operation phase of Upperchurch Windfarm would not be realised; Annual commercial rates payments to Tipperary County Council of est. €1.2 million per annum for the lifetime of the windfarm; Annual community benefit payments to local organisations of est. €88,000; and in relation to the local economy - Annual rental payments to 36 local landowners of €700,000 annually for the lifetime of the windfarm.

From a national security of supply point of view, should the Upperchurch Windfarm not be developed, there would be no positive contribution to the balance of payments through the substitution of an indigenous energy source (wind) for an imported energy source (fossil fuels).

However, the most significant impact of a 'do-nothing' scenario is the consequence of inaction in relation to climate change remediation. According to the Environmental Protection Agency:

> *Climate change impacts are projected to increase in the coming decades and during the rest of this century. Uncertainties remain in relation to the scale and extent of these impacts, particularly during the second half of the century. The greatest uncertainly lies in how effective global actions will be in reducing greenhouse gas emissions. Predicted adverse impacts include:*
>
> - *sea level rise,*
> - *more intense storms and rainfall events,*
> - *increased likelihood and magnitude of river and coastal flooding and*
> - *water shortages in summer in the east*
> - *adverse impacts on water quality*
> - *changes in distribution of plant and animal species*
> - *effects on fisheries sensitive to changes in temperature*

Climate change represents a serious threat to the environment. In response to the serious consequences of climate change, Ireland has signed up to the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement (which came into force in November 2016), and will contribute to climate change remediation via the Nationally Determined Commitment tabled by the EU in March 2015 on behalf of Member States, which commits to at least a 40% reduction in EU-wide emissions by 2030 (compared to 1990 levels). Nationally, the White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015 – 2030' aims to transform Ireland to a low carbon economy, with a target of 70% electricity generation to come from renewable sources by 2030. The Government of Ireland's Climate Action Plan 2019 iterates the 70% target of electricity from renewable sources by 2030, with on-shore wind envisaged as a key component of this effort.

In the 'do-nothing' alternative, **not developing the Upperchurch Windfarm project means that** there will be a **consequential loss of the carbon offset potential** and **the emission of 106,216 tonnes of greenhouse gases every year from the generation of electricity by fossil fuel plant would not be avoided**. If the UWF

Grid Connection does not proceed, the renewable generation for Upperchurch Windfarm will not be transported to the National Grid and the subsequent benefits of GHG offsets will not occur.

To conclude, the very high impact of Climate Change to biodiversity and to our human wellbeing, is reflected in the Irish Oireachtas declaring a climate and biodiversity emergency on the 9th May 2019.

The most significant impact of UWF Grid Connection not being developed is the secondary impact of Upperchurch Windfarm not being developed, this would be a **significant lost opportunity** to contribute to Ireland's action on **Climate Change remediation**.

UWF Grid Connection

EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 5: Description of the Development – UWF Grid Connection

ECOPOWER

October 2019

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List of Abbreviations

Abbreviation	Full Term
ABP	An Bord Pleanála
EDL	Ecopower Developments Limited
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
PD	Ecopower Project Design Environmental Protection Measure developed by members of the EIAR Team
RFI	Response to Further Information
SAC	Special Area of Conservation
SPA	Special Protection Area (for wild birds)

Abbreviation	Full Term
OCM	Outline Construction Methodologies
OHL	Overhead Line
UWF	Upperchurch Windfarm
UGC	Underground Cables

Glossary of Terms

Term	Definition
EIA Directive	European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU)
Environmental Factors	The factors in the environment required to be identified, described and assessed during the EIA process. These are specified in Article 3 (1) of the EIA Directive as Population and Human Health; Biodiversity; Land; Soils; Water; Air; Climate; Material Assets; Cultural Heritage and Landscape.
Competent Authority	The body legally delegated to decide on the Planning Application
Competent Expert	Experts who are qualified and competent in their field of expertise
Consented Windfarm	Upperchurch Windfarm – 22 wind turbines, substation, windfarm roads and ancillary works, consented in August 2014 under Planning Reference: Tipperary County Council 13/51/0003, ABP PL 22.243040
Element	One of the 5 No. elements listed in 'Whole UWF Project' below.
Project Design Environmental Protection Measures	Measures for environmental protection, incorporated into the design of the project.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Whole UWF Project	Project made up of 5 No. elements – UWF Grid Connection; UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities.

REFERENCE DOCUMENTS

Executive Summary - Description of the Development

UWF Grid Connection: Location and Characteristics

The subject development, UWF Grid Connection, will comprise of the following:

Mountphilips Substation: A new 110kV substation is proposed for a location adjacent to the existing Killonan - Nenagh 110kV overhead line in agricultural grassland in Mountphilips townland, 2km north of Newport, 4km south of Birdhill, 17km north east of Limerick City and 23km west of the Upperchurch Windfarm. The new 110kV electrical substation will comprise a substation compound, 230 meters east of the overhead line and c. 10290m^2 in area, which will contain a control building; 110kV busbars; circuit breakers; cable chairs; surge arresters; lightening protection monopoles (c.18m in height); and other electrical plant and apparatus; the Mountphilips Substation will also comprise 2 No. End Masts (c.16m in height) located under the existing Killonan – Nenagh 110kV overhead line and underground cabling between the End Masts and the electrical equipment in the Substation Compound will connect the new substation to the existing overhead line. Secure palisade perimeter fencing with gates will surround the compound.

Ancillary Works at the Mountphilips Substation site will support the construction and operation of the Mountphilips Substation and includes the widening of an existing farm entrance to provide a new Permanent Entrance at Coole townland; a permanent Access Road from the new Entrance to the substation compound; the installation of drainage systems at the Substation Compound and along the new Access Road, a temporary construction stage Compound at the Substation Compound; construction of new watercourse crossing structures (1 No. temporary and 2 No. permanent); temporary road to End Masts, and temporary crane hardstand at the End Mast location; hedgerow/tree removal and hedgerow and tree planting at the site entrance and along the new Access Road; fencing at the entrance, along the new Access Road and around the Substation Compound; provision of local electricity supply to Mountphilips; excavation and storage of soils and reinstatement works.

Mountphilips - Upperchurch 110kV UGC: The 110kV UGC will connect the new Mountphilips Substation to the Consented UWF Substation by 30.5km of underground cabling. At the Mountphilips Substation site, the 110kV UGC will be constructed under the new permanent access road. Outside of the Mountphilips Substation site, the route of the 110kV UGC is entirely on roads, mostly on the Limerick to Thurles Regional Road (R503). There is a short section of the 110kV UGC planned for under the network of Local Roads around Newport Town – between the proposed Mountphilips Substation site entrance at Coole, via Rockvale and Ahane to the R503 at Newport GAA Club, and Local Roads are also used at the eastern extent of the 110kV UGC, in Knockmaroe and Knockcurraghbola Crownlands townlands. The last section of the route is on a private paved road to the Consented UWF Substation location. The route bypasses Newport; passes through the village of Rear Cross; passes through the Slieve Felim to Silvermines Mountain SPA for 8km (entirely on the R503); crosses the boundary of the Lower River Shannon SAC at 6 No. points. Outside of the Mountphilips Substation site, the 110kV UGC will cross 65 No. watercourses, all of these crossings will be over or under existing watercourse crossing structures.

The 110kV UGC will be installed in trenches (c.1.25m deep and 0.6m wide), which will be laid with 5 cable ducts through which the 3 electrical cables, communications cables, and copper cables (if required), will be pulled. The cables will be pulled through the ducts and joined together in joint bay, communication and link box chambers located at regular Joint Bay points (42 No.) along the route. The ducts will be surrounded by concrete, and red cable protection strip, yellow warning tape, protective plates will be placed in the trench before the top of the trench is backfilled and reinstated. The only surface expression of the 110kV UGC will be the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates along the route. The design of the Mountphilips – Upperchurch 110kV UGC complies with ESB Networks specifications and technical and operational requirements.

Works and Activities for Mountphilips - Upperchurch 110kV UGC include;

- Traffic management around the construction works along the public road network will be managed along most of the route of the 110kV UGC with one-lane closures. However, due to the narrow nature of some of the roads, the Local Roads at Foildarrig / Oakhampton, Castlewaller / Carrowkeale /Derryleigh and Knockmaroe will need to be closed for between c.1 – 4 weeks. Local Access will be maintained. The closure will not be continuous throughout a given day, will occur during daylight hours but outside of local peak or important traffic periods. There are alternative traffic routes to avoid the works available on all of these roads.
- The works along the public road network will be scheduled to minimise impacts on schools and local businesses and will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.
- All excavated material from the 110kV UGC trenches in the roads outside of the Mountphilips Substation site will be classed as spoil and will amount to 23,380m^3, all of which will be removed to appropriately licensed waste facilities. There will be no storage of excavations outside of the Mountphilips Substation site.
- Along the 110kV UGC route on the public road, confirmatory road condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken. The roads will be reinstated according to the conditions of the Road Opening Licence, and will involve a combination of carriage lane reinstatement and full road reinstatement. The Promoter will fund the costs of Tipperary County Council engaging a chartered Civil Engineer to over-see quality control and compliance with drawings, specifications and road opening conditions for the duration of the works.
- Underground services, mainly comprising water main pipes, occur under most of the roads to be used for the 110kV UGC. Before construction, the services owners will be consulted and confirmatory surveys would be carried out ahead of works. In addition, the excavation works will be supervised by a banksman, and a supply of repair materials will be stocked at works locations.
- There will be 63 No. water crossings along the public road between the Mountphilips Substation site and the turn off for the Consented UWF Substation site. There are 2 No. crossings on the private paved road at Knockcurraghbola Commons to the Consented UWF Substation site. The watercourses range in size from rivers and streams to drains, and various crossing structures are already in place at all of these watercourses. The existing crossing structures comprise 15 No. bridges and 50 No. culverts (both box culverts and pipe culverts). The level of the road over the bridges and works to raise the height of the bridge parapet walls will be required at 3 No. bridges along the 110kV UGC route. In addition the existing culvert may require replacing at upto 13 No. of these watercourse crossing points which are mainly along the regional road.
- Outside of the Mountphilips Substation site, all 110kV UGC works will be carried out entirely in (or from) the road pavement/built environment, and with the exception of culvert replacement works, the construction works area boundary will not extend into the verges/natural environment. At culvert replacement works location; a minimal area of roadside vegetation may be required to be cleared, and then reinstated, to facilitate the replacement of the culvert. However, all works will take place from the road pavement.

Mitigation Measures

Project Design Environmental Protection Measures: The design of UWF Grid Connection includes 69 No. Project Design Environmental Protection Measures (Mitigation Measures) as per the schedule listed in Section 5.2.3 of this Chapter 5: Description of Development; also listed in Chapter 19: Mitigation Measures & Monitoring Arrangements of this EIA Main Report and in the Environmental Management Plan in Volume D. These mitigation measures were devised at the design stage of the project and during the EIAR process to avoid, prevent or reduce likely or potentially significant effects on the environment.

The project design environmental protection measures will be implemented through the Environmental Management Plan. 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.

UWF Grid Connection: Construction & Operation

UWF Grid Connection Construction Phase

Construction of the UWF Grid Connection is expected to commence in 2020/2021 and will take approx. 12 to 18 months. Up to 100 persons will be engaged in the construction of the UWF Grid Connection. Construction materials will be delivered to works areas consisting of a total of 1360 No. loads of concrete; 1350 No. loads of aggregate; and 210 No. loads of surface dressing (public road) which will be imported from Roadstone Killough, Co Tipperary; Roadstone Bunratty, Co Clare; and Rearcross Quarry, Shanballyedmond Rear Cross, Co Tipperary. Other deliveries relate to general building materials which will be delivered to the temporary compound at the Mountphilips Substation site and include cabling & ducting electrical plant and equipment, including switching gear, lattice towers, geotextile materials, fencing and hedging. These materials will be imported to the site from various suppliers throughout Ireland and the EU.

UWF Grid Connection Operational Phase

Once commissioned and energised, the UWF Grid Connection will be taken in charge by ESB Networks and the Mountphilips Substation and 110kV UGC will become part of the national electricity network. The new asset will be managed and operated by ESB Networks. Scheduled inspection and maintenance activities will be carried out by ESB Networks personnel (2 men crews) over a total of 13 days per year for the Mountphilips Substation and 110kV UGC. Very infrequent planned maintenance or unplanned repairs may be required, if at all, during the lifetime of the UWF Grid Connection, it is expected that planned maintenance or unplanned repairs, should they occur, will involve works at Joint Bay locations and will require one crew with c.6 ESB Networks personnel and machinery for 1 week – 2 weeks duration, depending on the nature of the repairs work. The UWF Grid Connection will remain permanently in place as part of the national electricity network and thus decommissioning is not envisaged.

UWF Grid Connection Use of Natural Resources

Construction Phase: There will be 4.8 hectares of agricultural **land** required for the construction works site. The remaining construction works areas relate to public road/built environment, which are not classified as a natural resource. No forestry will be felled for UWF Grid Connection. In relation to **biodiversity**, in total, 200m of hedgerow/earthen bank and 29 No. trees of varying maturity will be permanently removed, at the Mountphilips Substation site. A new hedgerow with semi-mature trees will be planted behind the new sightlines at the entrance. Also, an additional 700m of new hedgerow will be planted on the permanent berm to be created alongside the new Access Road between the Site Entrance and Mountphilips Substation. A mix of local provenance native species will be used. The berms around the substation and the side of the berms along the new access road will be sown with a mix of grasses and local provenance native wildflower species common to the surrounding vegetation. **Water** required for welfare facilities will be brought onto site. Approximately 5,300m^3 of soils (comprising topsoils, subsoils and rock) will be excavated from the works areas at the Mountphilips Substation site. Approximately 18,810m^3 of subsoils and rock will be excavated from road pavements along the route of the 110kV UGC outside the Mountphilips Substation site.

Operational Phase: Once the Development is constructed, the requirement for **lands** will reduce to 1.75ha, comprising the footprint of new permanent infrastructure within the Mountphilips Substation site. The agricultural lands will be reseeded with grass and returned to agricultural use. In relation to **biodiversity**: no further **hedgerow** or **tree pruning or removal** will be required during the operational stage. Non-potable **water** requirements will be provided at the Mountphilips Substation via a rain water harvesting system, and drinking water will be brought onto site as needed. No excavations of **soils** will be required during the routine operation of the UWF Grid Connection. Planned maintenance or unplanned repairs, if any occur are likely to

involve the re-opening of the underground chambers, at Joint Bays along the public road. This work is not likely to involve the excavation of any natural material.

UWF Grid Connection Emissions

Dust, construction machinery exhaust, noise, vibration and light will be emitted during the construction stage, however levels will not cause significant impacts. Negligible levels of dust and machinery exhaust are associated with operational and maintenance activities. During operation, Mountphilips Substation will emit **noise** however this is not likely to be audible above the existing background noise levels at nearest residence, which is 385m distant. The operational Mountphilips Substation and 110kV UGC will be a source of very low frequency (50Hz) electromagnetic fields, levels will be substantially under threshold limits.

UWF Grid Connection Waste

Waste water from construction stage welfare facilities will be contained in self-contained units and emptied by a licenced facility. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at the Temporary Compound at the Mountphilips Substation site. Waste will be collected by an appropriately licensed waste contractor. Any wastes which result from the construction of the UWF Grid Connection will be managed under a specific **Waste Management Plan**. Bitumen bound surface dressing, base layer aggregates, subsoil and rock will be excavated from the public road for the 110kV UGC trenches and joint bay locations. All of this material will be classed as spoil and will amount to 23,380m^3, all of which will be removed to appropriately licensed waste facilities. Excavated material from the sections of the 110kV UGC within 15m of an Invasive Species infestation, will be classed as Hazardous Waste and disposed of as potentially contaminated material, by a licensed contractor to a suitably licensed waste facility. This amount to c.760m^3 of the total 23,380m^3 of excavated material.

There will be minimal general and chemical waste during the Operational Stage, with any waste taken offsite by ESBN personnel.

Vulnerability of UWF Grid Connection to Major Accidents and/or Disasters

The UWF Grid Connection **is not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles and very small volumes of grease and sulphur hexafluoride (SF6) gas used at the Mountphilips Substation. There are **no Seveso sites in proximity** to the site. **It is Extremely Unlikely that the development will cause a flooding disaster** because of the underground nature of the 110kV UGC, the location of the UWF Grid Connection predominantly outside of flooding areas, the fact that all permanent hardstanding at the Mountphilips Substation site will have runoff control measures and all new permanent watercourse crossing structures will be sized for peak flood flows. **It is Extremely Unlikely that a lands slippage event will occur** due to the stable soils at Mountphilips Substation and the location of the routing of the cabling along the public roads. **The development is not susceptible to extreme weather events as a consequence of climate change** such as flooding, high winds or temperature extremes due to the location of the 110kV UGC underground and within road pavements/built surfaces, and due to the design of the electrical plant at Mountphilips Substation which will be able withstand temperature variability and exposure in the open countryside. Should a Major Accident or Disasters occur, unconnected to the Whole UWF Project, but in the locality – environmental protection measures have already designed into the project which will ensure that the project will not make the consequences of the event worst. Additionally, the presence of the project will not increase the likelihood of Major Accidents or Disasters occurring.

Other Projects Considered

Under the EIA Directive, the totality of a project must be considered which includes off-site related projects, secondary project and other unrelated projects and activities.

Off-Site Project - The Whole UWF Project

Off-site projects are projects which are which are integral to the subject project. The subject application (UWF Grid Connection) is part of a whole project which comprises the following other related off-site projects – UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities. These are collectively referred to as the Whole UWF Project in this EIA Report. The purpose of the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities elements is to facilitate the construction and operation of the already consented Upperchurch Windfarm.

Secondary Projects

Secondary projects are projects that arise largely because of the existence of the principle project, though they are not usually carried out by the developer of the principle project. No secondary projects are currently known or planned to occur as a result of the existence of the UWF Grid Connection.

Other Projects or Activities

Other Projects or Activities relate to existing or consented (or proposed or in some cases *potential*) projects and on-going activities in the area, which are not connected to the subject project, and which by addition could create larger more significant effects to the environment. Other Projects & Activities in the area were scoped for inclusion in this assessment, using geographical and time-frame boundaries and conceptual site model exercises. Other Projects include the existing Killonan to Nenagh 110kV Overhead Line, existing Shannonbridge – Killonan 220kV Overhead Line, *potential* Bunkimalta Windfarm; consented Castlewaller Windfarm and *potential* associated grid connection; existing Milestone Windfarm; all operating wind turbines in the Irish State; existing Rear Cross Quarry; existing Foilnaman Mast; existing Cummermore Communications Pole; consented Newport Town Park; and the recently proposed Quarry at Curraghduff. Other Activities include general agriculture, forestry and turf cutting activities which are on-going in the wider surrounding area.

5 Description of Development - UWF Grid Connection

5.1 Introduction to Chapter 5

5.1.1 Overview and Purpose of UWF Grid Connection

Upperchurch Windfarm (UWF) has already received planning permission but is not yet constructed. This application is for grid connection works (UWF Grid Connection) to connect the windfarm to the national electricity system.

UWF Grid Connection comprises two main parts;

- the first part is the proposed '**110kV UGC'** which is a 30.5km long underground electrical cabling network at high voltage (110 kilovolts (kV)), to connect the already consented Upperchurch Windfarm substation at Knockcurraghbola Commons townland to a new proposed substation at Mountphilips townland;
- the second part is a proposed 110kV electrical substation '**Mountphilips Substation'**, which will manage and control the power coming (via the 110kV UGC) from the consented Upperchurch Windfarm, and from Mountphilips Substation the power will be transported to national electricity system, at an adjacent point on the existing Killonan to Nenagh 110kV overhead line.

5.1.1.1 Changes in this 2019 Application 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 Upperchurch Substation site is wholly under the public road (except for 700m under a private paved road at the Upperchurch Windfarm 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. This is to reflect new layout requirements in Eirgrid Specifications for a loop substation (such as Mountphilips Substation). The expansion of the substation footprint will result in;

- Excavations increasing by 15% for the larger compound - excavation depths remain the same;

- Site Layout changes for the Control Building, Electrical Equipment and Apparatus, Temporary Compound, and Site Drainage System and Berms around the compound;

- No change to the location, layout or number of watercrossings at the Mountphilips Substation Site (W1, W2, W3);

- No change to the location or layout of the New Permanent Access Road and Berms; Mountphilips Substation Site Entrance or the low voltage electrical supply cable under the New Permanent Access Road;

- No change to the location, layout or height of the End Masts and no change to the location or layout of the Temporary Access Road or watercrossing (W1) to the End Masts.

5.1.2 Layout of this Chapter 5

UWF Grid Connection is described in this chapter, in the following order:

Section 5.2	A Description of the Characteristics of the subject development (UWF Grid Connection), including the location, the size and design, and the environmental protection measures.
The Development as described in Section 5.2 At the conception of the UWF Grid Connection, the Project Design and EIAR teams evaluated the potential or likely significant effects of the subject development, on the receiving environment. Any potential or likely significant effects were avoided through the implementation of various measures, particularly options for mitigation by avoidance and mitigation by prevention; these included alternative locations, alternative designs and alternative processes and through the integration of mitigation measures into the fundamental design of the UWF Grid Connection. Once the chosen location, design and process was decided the proposal was examined for opportunities to incorporate further environmental protection measures (generally mitigation by reduction) in the final iteration of the development. The development, as described in Section 5.2, is the final iteration of the UWF Grid Connection. It is this final iteration that is examined in Chapters 6 to 17, for effects on the prescribed environmental factors, by the topic competent experts.	
Section 5.3	The durations and timing, main activities, personnel and material requirements for both the construction and operation stages. Any changes to the UWF Grid Connection, such as decommissioning.
Section 5.4	The use of natural resources, emissions and production of wastes for each stage.
Section 5.5	The vulnerability of the UWF Grid Connection to major accidents, natural disasters and climate change.
Section 5.6	Cumulative Information: For the purposes of cumulative assessment of the whole Upperchurch windfarm project (Whole UWF Project), a description of the Other Elements of the Whole UWF Project namely; UWF Related Works; UWF Replacement Forestry; Upperchurch Windfarm (UWF) and UWF Other Activities, is provided. For the purposes of a cumulative assessment with other existing or consented projects or activities, a description of Other Projects or Activities that were scoped in by the EIAR Team is also provided.

5.2 Characteristics of UWF Grid Connection

5.2.1 Location of UWF Grid Connection

Mountphilips Substation: The new substation is proposed for a location adjacent to the existing Killonan - Nenagh 110kV overhead line in agricultural grassland in Mountphilips townland, 2km north of Newport, 4km south of Birdhill, 17km north east of Limerick City and 23km west of the Upperchurch Windfarm. The new electrical substation will be 160m east of the existing Killonan – Nenagh 110kV overhead line.

Mountphilips - Upperchurch 110kV UGC: The 110kV UGC will connect the new substation at Mountphilips to the already consented substation at Upperchurch Windfarm (Consented UWF Substation) by underground cabling (30.5km), mainly in the public road.

Starting at Mountphilips Substation, the route of the 110kV UGC follows the local road network through Rockvale and Ahane Cross, around Newport town, joining the Limerick to Thurles road (R503) on the east side of Newport town, at the GAA club. From that point, the 110kV UGC will be installed in R503 as far as the turnoff for Borrisoleigh at Knockmaroe. From there, the 110kV UGC uses the local road network and a private paved road to the Consented UWF Substation.

The route bypasses Newport; passes through the village of Rear Cross; passes through the Slieve Felim to Silvermines Mountain SPA for 8km (entirely on the R503); crosses the boundary of the Lower River Shannon SAC at 6 points (entirely on the public road and over existing bridges); and will be installed under or over 65 existing watercourse crossing structures.

The 110kV UGC will start at Mountphilips Substation; will be installed under the new access road for 0.5km as far as the Mountphilips Substation site entrance off the L2166-10 local road; then the 110kV UGC will be installed in Local Road L2166-10 for 0.7km as far as Coole Crossroads, in Local Road L6013-0 for 1.2km; over Rockvale Bridge in the L2156-0 for 0.4km; in the L2157-0 for 0.8km as far as Ahane Crossroads and in the L6009-0 for 1.8km, joining the R503 at Newport GAA Club. The 110kV UGC is then routed under the R503 for 22.1km eastwards until the turn off at Knockmaroe townland, onto the L2264-50. The route to the consented UWF Substation is along the local road network from the Knockmaroe junction - in the L2264-50 for 1.9km; then in the L6188-0 for 0.3km as far as the junction with a private paved road at Knockcurraghbola Commons. The final section of 110kV UGC will be installed in the private paved road for 0.7km and then in the Consented UWF Substation compound for the last 20m.

The 110kV UGC route is through the townlands of Mountphilips, Coole, Freagh, Foildarrig, Oakhampton, Rockvale, Mackney (O'Brien), Mackney (Bourke), Ahane, Newross, Castlewaller, Carrowkeale, Tullow, Cooldrisla, Derryleigh, Kilnacappagh, Scraggeen, Derrygareen, Inchadrinagh, Knockancullenagh, Fanit, Lackamore, Tooreenbrien Upper, Tooreenbrien Lower, Reardnogy Beg, Reardnogy More, Shanballyedmond, Baurnadomeeny, Coonmore, Foildarragh, Kilcommon, Loughbrack, Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons.

Relevant Figures: Volume C3 EIAR Figures

Figure GC 5.1: Location of the UWF Grid Connection on OSI Discovery Mapping

Figure GC 5.2: Layout of the Mountphilips Substation Site on Aerial Photography Mapping

Figure GC 5.3: Layout of the 110kV UGC outside of the Mountphilips Substation Site (Overview and Maps 1 to 4)

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

5.2.2 Size and Design of UWF Grid Connection

5.2.2.1 Mountphilips Substation

The Mountphilips Substation will be constructed close to the existing Killonan - Nenagh 110kV overhead line. The design is based on similar high voltage looped-in 110kV substations and complies with ESB Networks specifications, technical and operational requirements. The Mountphilips Substation will comprise:

- Substation Compound measuring c.10290m^2 in area, and will contain a control building; 110kV busbars; circuit breakers; line disconnects; current and voltage measuring equipment; cable chairs; surge arresters; lightening protection monopoles (c.18m in height) and other electrical apparatus, underground cabling and access roads. Secure perimeter fencing comprising 2.7m high palisade security fencing, which will surround the Substation Compound and will include 4.8m wide entrance gates. A permanent surface water drainage network will be installed around the compound. The Mountphilips to Upperchurch 110kV UGC will connect to the electrical equipment in the compound from the east side of the compound.

- Control Building, measuring c.375m^2 in area, located inside the Substation Compound, and will contain circuit breakers, electrical metering equipment and other electrical equipment, communications and control equipment, and welfare facilities comprising a self-contained toilet and an integrated rainwater harvesting system.

- 2 No. End Masts and associated underground 110kV cables will be used to connect the Mountphilips Substation onto the existing Killonan – Nenagh 110kV overhead line (OHL). These End Masts will be constructed beneath the existing Killonan – Nenagh 110kV OHL and are identified as End Mast No.1 and End Mast No.2. The End Masts will be lattice towers and will each be c.16m in height. 110kV cables will connect to the Killonan side of the overhead line at End Mast No.1, be affixed to the mast and then through underground ducting to the Mountphilips compound, through the electrical equipment and control building in the substation compound, and then back onto the overhead through End Mast No.2 and onto the Nenagh side of the overhead line. The cables from End Mast No. 1 and End Mast No.2 will connect to the electrical equipment in the compound from the west side of the compound.

Plate 5-1: Example of similar 110kV substation with End Masts connecting to overhead 110kV line

Relevant Volume C3 EIAR Figures:

Figure GC 5.2: Layout of the UWF Grid Connection on Aerial Photography Mapping
Figure GC 5.4: Plan of Mountphilips Substation Compound
Figure GC 5.5: Elevation of Mountphilips Substation Compound
Figure GC 5.6: Plan and Elevation of the Control Building at Mountphilips Substation

Figure GC 5.7: Plan and Elevation of the End Masts at Mountphilips Substation

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures
GC_OCM_02: Mountphilips Substation Compound
GC_OCM_03: New End Masts at Mountphilips Substation

5.2.2.2 Ancillary Works at Mountphilips Substation Site

Ancillary Works at the Mountphilips Substation site will support the construction of the Mountphilips Substation for the UWF Grid Connection and includes the construction and use of a Temporary Construction Compound at the Mountphilips Substation site; the construction of a new permanent Entrance at Coole townland (including the provision of sightlines) at an existing farm entrance; the construction of a permanent Access Road from the new entrance to the proposed substation at Mountphilips townland; the installation of drainage systems at Mountphilips Substation, around the Temporary Construction Compound and along the new Access Road; construction of temporary and permanent watercourse crossing structures at Mountphilips; hedgerow/tree removal and hedgerow and tree replanting at the site Entrance and along the new Access Road; fencing at the Entrance, along the new Access Road and around the Substation Compound; provision of electricity supply to Mountphilips; excavation and storage of soils; reinstatement works.

The **'Mountphilips Substation site'** referred to in this EIA Report consists of the area from the End Masts to the Entrance from the public road in the townlands of Mountphilips and Coole, and includes the proposed Mountphilips Substation Compound, End Masts, new Access Road, permanent Entrance, and the ancillary works and also includes the western extent of the 110kV UGC between the Substation Compound and the site Entrance.

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures
GC_OCM_01: Pre-Construction Activities

5.2.2.2.1 Temporary Construction Compound

A temporary construction compound will be set up during the construction stage at Mountphilips Substation location, to support the construction of Mountphilips Substation and ancillary works, and the construction of the Mountphilips to Upperchurch 110kV UGC.

The temporary construction compound will be approximately 1090m^2 in area, excavated as part of the substation compound excavations, and finished in stone. The compound will accommodate parking, site offices, and canteen and welfare facilities along with designated storage areas for materials, wastes, oils and fuels.

Relevant Volume C3 EIAR Figures:

Figure GC 5.2: Layout of Mountphilips Substation Site on Aerial Photography Mapping
Figure GC 5.8: Plan View of the Temporary Construction Compound at Mountphilips Substation site

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures
GC_OCM_09: Temporary Compound at Mountphilips Substation

5.2.2.2.2 New Permanent Entrance at Coole townland

A new permanent site entrance will be provided through an existing farm entrance off the L2166-10, for the Mountphilips Substation and Temporary Construction Compound. The existing farm entrance will be widened to 10m, with a visibility splay of 160m provided. The sightlines are based on the 85th percentile ambient traffic speed on the Local Road serving the access, as recorded during traffic count surveys. These sightlines will be provided through the partial removal of the roadside boundary and the pruning of any hedgerow or trees within the visibility splay. The hedges or trees that are removed will be replaced with an equivalent length of hedge and/or number of trees which will be replanted behind the sight lines. Each entrance will be fenced with post and rail and an entrance gate will be installed set back 4.8m from the road edge.

Relevant Volume C3: EIAR Figures

Figure GC 5.9: Plan View of Permanent Site Entrance at Coole (Mountphilips Substation Site Entrance)

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures
GC_OCM_08: Permanent Site Entrance at Mountphilips Substation Site

5.2.2.2.3 New Permanent Access Road at Mountphilips Substation site

A new access road, 4.5m in width, will be constructed using 'excavate and fill' technique, from the new permanent Entrance, across four grassland fields to provide access to the Mountphilips Substation. The new access road will also provide access to the Temporary Construction Compound. The road will be constructed of crushed stone over a layer of geotextile material and will incorporate permanent roadside drains including check dams and settlement ponds, to slow down flow and settle suspended solids in water runoff. The new road will be bounded with new earthen berms which will be planted with new hedgerows comprising locally sourced native fruiting hedgerow species, the sides of the berms will be sown with a seed mix of grasses and wildflower species common to the surrounding vegetation.

Relevant Volume C3: EIAR Figures

Figure GC 5.2: Layout of Mountphilips Substation Site on Aerial Photography Mapping
Figure GC 5.10: Cross Sections of the New Permanent Access Road to Mountphilips Substation

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures
GC_OCM_06: New Permanent Access Road at Mountphilips Substation

5.2.2.2.4 Temporary Works to facilitate the construction of the End Masts

Temporary Access Road: A temporary stone access road will be constructed by overlaying aggregate on a geotextile material. No excavations will be required. The Temporary access road will be located between the Mountphilips Substation and the End Mast locations. This road will be removed and reinstated following the commissioning of Mountphilips Substation. The stone from this temporary access road will be reused on the permanent access road at the Mountphilips Substation site.

Temporary Crane Hardstand: A temporary hardstanding area will be provided adjacent to the End Mast locations to facilitate the lifting of the End Masts into place using a crane. The footprint of this hardstand will be excavated and filled with aggregate. The excavated soils will be temporarily stored in a berm, and used to reinstate the crane hardstand area following the erection of the End Masts. The stone will be reused along the new permanent access road.

Relevant Volume C3: EIAR Figures

Figure GC 5.2: Layout of Mountphilips Substation Site on Aerial Photography Mapping
Figure GC 5.11: Cross Section of Temporary Access Road at Mountphilips Substation

5.2.2.2.5 Drainage Systems at the Mountphilips Substation site

An **integrated drainage system** will be installed around the Substation Compound, the temporary hardstanding area at the End Mast locations, the Temporary Compound and along the new permanent Access Road to the Substation Compound. This integrated drainage system will keep 'clean' water upslope of the works separate from 'dirty' water runoff from construction works areas, while maintaining the existing drainage regime through the regular piping and release of clean water from the upslope side the works area to the downslope side. The integrated drainage system will include the installation of check dams, settlement ponds, clean water cross drains and outfall weirs. These parts of the drainage system will effectively avoid any contribution to flooding risk, minimise erosion, maintain drainage regimes, and minimise the amount of sediment entering downslope watercourses, through the attenuation (slow-down) of water flow rates and the settlement of suspended solids (sediment). Settlement ponds will be removed following construction. The rest of the drainage system will be left in place for the operations phase. The drainage system at temporary works locations will be removed. The drainage system is intended for the management of surface waters within the substation site, in line with effective surface water control and for the protection of local water features only. There are no requirements for such measures arising as a requirement to avoid/reduce the likelihood of significant effects on European Sites, due to separation distance via hydrological pathways.

A permanent concealed drain will be installed at the substation entrance on the Local Road to prevent water runoff from construction areas, flowing onto the road. This drain will be directed into an infiltration trench. Existing roadside drainage which occurs close to road works associated with the substation entrance will be piped to maintain flow if necessary.

Relevant Volume C3 EIAR Figures: The drainage system is identified on:

Figure GC 5.2: Layout of Mountphilips Substation Site on Aerial Photography Mapping

5.2.2.2.6 Watercourse Crossings at the Mountphilips Substation site

There are 3 watercourse crossings required at the Mountphilips Substation site, none of which have existing crossing structures in place:

- **W1:** Watercourse crossing W1 is a stream crossing. In order to install the underground cabling and gain construction access from the substation to the End Masts watercourse crossing works will be required at Watercourse Crossing point W1. The ducts for the underground cables will be installed under W1 in a trench. During the trenching works, the watercourse will be dammed, and the water will be pumped through a flume pipe from the upstream side of the works to the downstream side. When the trenching works are completed, the flume and dam will be removed and the banks and bed of the watercourse will be reinstated. Access from the substation to the End Masts will be provided by installing a temporary Bailey bridge at W1, which will not require any instream works.

- **W2:** Watercourse crossing W2 relates to drains located in the corner of a field which will be crossed by the 110kV UGC and the new access road. These drains flow into the stream associated with W1. New culvert crossing structures will be constructed at the crossing point of these field drains. It should be noted that the drainage system in the adjacent forestry lands are not connected to the field drains, and instead drain towards W3. These works will require that the watercourse is dammed, and the water pumped from the upstream side of the works to the downstream side, while the 110kV UGC and a new permanent bottomless concrete structure is being installed. The new access road will then be built over the concrete structure. When the trenching, crossing structure and access road are completed, the banks and bed of the watercourse will be reinstated and the dam removed.

- **W3:** Watercourse crossing W3 is a crossing of a small watercourse by the 110kV UGC and the new access road. These works will require that the watercourse is dammed, and the water pumped from the upstream side of the works to the downstream side, while the 110kV UGC and a new permanent bottomless concrete structure is being installed. The new access road will then be built over the concrete structure. When the

trenching, crossing structure and access road are completed, the banks and bed of the watercourse will be reinstated and the dam removed.

Relevant Volume C3 EIAR Figures:

Figure GC 5.2: Layout of Mountphilips Substation Site on Aerial Photography Mapping
Figure GC 5.12: Cross Sections of Temporary Bailey Bridge Crossing at Mountphilips Substation Site
Figure GC 5.13: Cross Sections of New Permanent Culvert at Mountphilips Substation Site

Relevant Volume C4 EIAR Appendices

Appendix 5-2: Inventory & Classification of Watercourses at Crossing Locations
Appendix 5-1: Outline Construction Methodologies and Best Practice Measures
GC_OCM_05: Instream Works and Temporary Bailey Bridge Crossing At W1
GC_OCM_07: Installation of 110kV UGC and new crossing structures at W2 and W3

5.2.2.2.7 Hedgerow and tree removal and replanting at the Mountphilips Substation site

160m of hedgerow and 18 trees (17 immature and 1 mature) will be removed at the substation site entrance to widen the entrance and provide sightlines. These will be reinstated by planting the equivalent amount of hedgerow and semi-mature trees behind the new sightlines.

40m of hedgerow and 11 immature trees will be removed to build the new access road. A new hedgerow, c.700m in length, will be planted on the berms on either side of the new Access Road between the Site Entrance and Mountphilips Substation and on the berms around the substation compound for the benefit of biodiversity in the area.

All new hedging will comprise locally sourced native fruiting hedgerow species and the replacement trees will be semi-mature native hedgerow tree species. In addition, the sides of the berms will be sown with a seed mix of grasses and wildflower species common to the surrounding vegetation.

Relevant Volume C3 EIAR Figures: Temporary and Permanent Hedgerow removal is identified on:

Figure GC 5.2: Layout of Mountphilips Substation Site on Aerial Photography Mapping

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures
GC_OCM_11: Reinstatement of Lands at Mountphilips Substation Site

5.2.2.2.8 Fencing at the Mountphilips Substation site

Fencing will be erected at the Mountphilips Substation site per;

- Permanent timber post and rail fencing with gates will be erected at the substation Entrance in Coole.

Permanent timber post and rail fencing will be erected along the new Access Road to the Mountphilips Substation. Gates will be erected along the boundary of the new access road, which will allow livestock and farm machinery to cross over the new access road, thereby restoring access to the adjacent agricultural lands.

5.2.2.2.9 Provision of electricity supply to Mountphilips Substation

Mountphilips Substation will require a low voltage electricity supply, in order to energise and run electrical plant and general services at the compound. This supply will be taken from an overhead electrical line which passes through the 1st field, 105m from the substation entrance off the public road. The line is a 10kV overhead line carried on a standard wooden pole. The pole will be fitted with a transformer in order to transform

the electricity to low voltage (230V), which is suitable for use in the substation. The electricity thus transformed will be cabled underground to the Control Building in the Substation Compound, in a duct which will be laid alongside the 110kV UGC ducting, under the new Access Road.

5.2.2.2.10 Storage of Excavated Materials at the Mountphilips Substation site

The storage of excavated materials is limited to the excavations associated with groundworks at the Mountphilips Substation site - for the construction of Mountphilips Substation, site entrance, permanent access road, drainage and underground cabling at the Mountphilips Substation site.

In total, approximately 5,300m^3 of soils will need to be excavated, comprising 4,060m^3 of **topsoil**, 1,200m^3 of **subsoil** and 30m^3 of **rock**.

5,000m^3 of the excavated material will be permanently stored in linear berms along the new access road and around the substation compound and 300m^3 of the excavated topsoil will be used to reinstate within the works area at Coole/Mountphilips.

Relevant Volume C3 EIAR Figures*: Permanent Berms locations are identified on:*

Figure GC 5.2: Layout of Mountphilips Substation Site on Aerial Photography Mapping

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_10: Formation of Overburden Storage Berms at Mountphilips Substation site

5.2.2.2.11 Reinstatement of Lands at the Mountphilips Substation site

Following the completion of construction works at the Mountphilips Substation site, any lands outside of new permanent infrastructure but within the boundary of the Mountphilips Substation site (which includes the site entrance from the public road, new access road to the substation compound, compound area and the End Mast locations) will be reinstated, as per:

- Native hedging plants will be planted on the berms on either side of the new access road and on the berms around the substation compound. A mix of local provenance native fruiting hedge species such as hawthorn, blackthorn, holly, hazel, guelder rose, spindle, crab apple, bird cherry, elder and buckthorn, will be used.
- The side of the berms along the new permanent Access Road and around the substation compound will be seeded with grasses and flower species common to the surrounding vegetation. Local provenance native wildflower seed of flowering plants like clovers, vetches and knapweed will be sown.
- Immature trees removed at the entrance, will be replaced with semi-mature trees (i.e. at least ten years growth), behind the new sightlines, on a like-for-like basis.

The agricultural lands outside the permanent fence which will be erected for the Mountphilips Substation site, will be reseeded with grass and returned to agricultural grassland use.

Landholding access to lands on either side of the new access road will be maintained by the erection of gates along the boundary of the new access road, which will allow livestock and farm machinery to cross over the new access road.

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_11: Reinstatement of Lands at Mountphilips Substation Site

5.2.2.3 Mountphilips – Upperchurch 110kV UGC

5.2.2.3.1 Location of the 110kV UGC

Within the Mountphilips Substation site, the 110kV UGC is located under the new permanent access road between the substation compound and the site entrance.

Outside of the Mountphilips Substation site, all works will be carried out within the road pavement/built surfaces. Outside the Mountphilips Substation site, the route of the 110kV UGC is entirely on roads, mostly on the Limerick to Thurles Regional Road (R503). There is a short section of the 110kV UGC planned for under the network of Local Roads around Newport Town – between the Mountphilips Substation site Entrance to the north-west and the junction of the Newport GAA Club to the east of the town - and also at the eastern extent of the 110kV UGC between the junction of the local road L2264-50 with the R503 in Knockmaroe and the private road to the Consented UWF Substation in Knockcurraghbola Commons.

Outside of the Mountphilips Substation site, all 110kV UGC works will be carried out entirely in (or from) the road pavement/built environment, and with the exception of culvert replacement works, the construction works area boundary will not extend into the verges/natural environment. At culvert replacement works location; a minimal area of roadside vegetation may be required to be cleared, and then reinstated, to facilitate the replacement of the culvert. However, all works will take place from the road pavement.

Relevant Volume C3 EIAR Figures

Figure GC 5.2: Layout of Mountphilips Substation Site on Aerial Photography Mapping

Figure GC 5.3: Layout of the 110kV UGC outside of the Mountphilips Substation Site (Overview/ Maps 1-4)

5.2.2.3.2 The 110kV UGC Trench, Cables and Joint Bays

The 110kV UGC will be installed in trenches (c.1.25m deep and 0.6m wide), which will be laid with 5 cable ducts through which the 3 electrical cables, communications cables, and copper cables (if required), will be pulled. The ducts will be laid on bedding sand, and then surrounded by concrete, and red cable protection strip and yellow warning tape, and steel protective plates if required at the location, will be placed in the trench before the top of the trench is backfilled and reinstated.

The cables will be pulled through the ducts and joined together in 42 No. Joint Bays, communication and link box chambers which will be constructed at regular Joint Bay points along the route. Each Joint Bay will comprise 3 underground pre-cast concrete chambers – a joint bay chamber, communication chamber and a link box chamber. Once the cables have been jointed and commissioned, the chambers will be filled with sand and a concrete cover fitted on top of the chamber. The road surface will be reinstated over the chambers with man-hole type covers over the Joint Bays fitted at road surface level. Over-ground identification marker posts and marker plates will be installed along the route. These manhole covers and marker plates/posts will be the only surface expression of the 110kV UGC.

The design of the Mountphilips – Upperchurch 110kV UGC complies with ESB Networks specifications and technical and operational requirements.

Plate 5-2: Typical Trenching Works set-up on the Public Road

Relevant Volume C3 EIAR Figures:

Figure GC 5.3: Layout of the 110kV UGC outside of the Mountphilips Substation Site (Overview and Maps 1 to 4) showing joint bay locations

Figure GC 5.14: Cross Section of 110kV UGC in the Public Road

Figure GC 5.15: Views of 110kV UGC Joint Bays

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_12: 110kV Trenching & Ducting

GC_OCM_13: 110kV Joint Bays and Associated Chambers

GC_OCM_14: 110kV Cable Pulling

GC_OCM_15: 110kV Cable Jointing

5.2.2.3.3 Watercourse Crossing Works for the 110kV UGC

In total, there will be 68 No. watercourse crossings required for the 110kV UGC. 3 watercourse crossings (W1, W2 and W3) are at the Mountphilips Substation site, described above at Section 5.2.2.2.5 above. The remaining 65 No. are located along the route of the 110kV UGC outside of the Mountphilips Substation site - there will be 63 No. crossings (W4 to W66) along the public road between the Mountphilips Substation site and the junction onto the private paved road to the Consented UWF Substation site, the remaining 2 No. crossings (W67 and W68) are on the private paved road.

The 65 No. watercourses along the 110kV UGC outside the Mountphilips Substation site, range in size from rivers and streams to drains. The 110kV UGC will cross all of these watercourses at existing crossing locations. The existing crossing structures comprise 15 No. bridges and 50 No. culverts (both box culverts and pipe culverts).

Trenching over existing bridges: During the trenching works over the bridges, edge protection such as sandbags, will be set up to prevent debris falling into the watercourse below. All of the works will be carried out from the bridge structure rather than from the lands below. There is sufficient cover (depth of road) at the 12 No. of the 15 No. bridges to install the 110kV UGC within the existing road surface and therefore no works to the bridges, such as changes to the height of the road or to the height of the parapet walls will be required.

All trenching works over bridges will be carried out under a Road Opening Licence and in accordance with the Department of Transport, Tourism & Sport *Guidelines for Managing Openings in Public Roads (April 2017).* See Figures GC 5.16: Cross Sections of 110kV UGC at Bridge Crossings.

Raising Road level 3 No. bridges (W7, W36, W53): At the 3 No. remaining bridges (W7, W36, W53 on Figure GC 5.17: Remedial Works to Bridges at W7, W36 and W53), the construction and installation of the 110kV UGC will require that the road level is raised slightly to accommodate the cable trench so that there is enough clearance between the road surface and the 110kV UGC to satisfy ESB specifications. The road level at W7 will be raised by 23cm; the road level at W36 will be raised by 14cm; and road level at W53 will be raised by 35cm.

Works to Parapet Walls at 3 No. bridges (W7, W36, and W53): At these bridges, the height of the parapet[1] walls will need to be raised to the required safe height. A parapet wall at W7 will be raised by c.0.15; the parapet walls at W36 will be raised by c.70cm; and parapet walls at W53 will be raised by c.75cm. During remedial works to parapets, netting or other barriers will be set up below the works. All of the works will be carried out from the bridge structure rather than from the lands below.

One of these bridges (Anglesey Bridge at W53) is a National Inventory of Architectural Heritage (NIAH) site, and therefore remedial works to the parapet walls will be carried by a specialist architectural restoration stonemason under the supervision of a suitably qualified conservation engineer, with completed works certified by a suitably qualified conservation engineer. The remedial works at Anglesey Bridge will use traditional materials taking due regard of the status of the bridge, and will be carried out in accordance with good building conservation principles as stated in the International Charter for the Conservation and Restoration of Monuments and Sites Charters (1979-88).

All works to bridges, including any works to the parapets will be carried out under a Road Opening Licence and in accordance with the Office of Public Works (OPW) Guidelines *Construction, Replacement or Alteration of Bridges and Culverts (2013),* and also with the Department of Transport, Tourism & Sport *Guidelines for Managing Openings in Public Roads (April 2017).* See Figures GC 5.16: Cross Sections of 110kV UGC at Bridge Crossings.

Crossing by Horizontal Directional Drilling (HDD): 2 of the 15 bridges (W8, W9) do not have sufficient cover to accommodate the installation of the 110kV UGC over the bridge in the road, and substantial changes to the existing structure would be required to accommodate the 110kV UGC. Instead, at these two locations the 110kV UGC will cross underneath the water using directional drilling techniques, whereby a hole is bored by a drilling rig under the water channel, and the ducting is pulled through. Using this technique means that there is no interference with the water channel or instream works.

Crossing existing culverts: The 110kV UGC will be laid either under or over the 50 No. culverts, there will be no works on 37 No. of these culverts as these culverts are made from plastic or concrete. Of these 37 No. culverts, at 22 No. locations there is sufficient cover between the culvert structure and road surface and the

[1] Parapet walls are the safety barriers, generally low walls, at the edge of the bridge to provide protection from falls to people and vehicles

110kV UGC will be installed over the culvert, at 15 No. locations there is not sufficient cover between the culvert and the road and the 110kV UGC will be installed under the structure.

Replacing Existing Culverts: At the remaining 13 No. locations, at W13, W14, W15, W17, W19, W20, W32, W34, W55, W57, W60, W61 and W64, there is not sufficient cover over the culvert, and the cabling will have to be installed under the structure. All of these culverts are old masonry culverts, and may need to be replaced during the works. For the purposes of this EIA Report, it is evaluated as a worst case scenario that all 13 No. culverts will be replaced. 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.

Any culvert replacement works will be in accordance with the Office of Public Works (OPW) Guidelines *Construction, Replacement or Alteration of Bridges and Culverts (2013),* and also with the Department of Transport, Tourism & Sport *Guidelines for Managing Openings in Public Roads (April 2017).*

Relevant Volume C3 EIAR Figures:

Figure GC 5.3: Layout of the 110kV UGC outside of the Mountphilips Substation Site (Overview and Maps 1 to 4) *showing watercrossing locations*
Figures GC 5.16: Cross Sections of 110kV UGC at Bridge Crossings
Figure GC 5.17: Remedial Works to Bridges at W7, W36 and W53
Figure GC .18: Horizontal Directional Drilling at W8 and W9
Figure GC 5.19: Cross Sections of 110kV UGC over and under existing culverts
Figure GC 5.20: Cross Sections of Replaced Culvert along the 110kV UGC

Relevant Volume C4 EIAR Appendices:

Appendix 5-2: Inventory & Classification of Watercourses at Crossing Locations
Appendix 5.1: Outline Construction Methodologies and Best Practice Measures
GC_OCM_16: Replacing existing culverts along the 110kV UGC
GC_OCM_17: Raising road level and parapet walls at Rockvale Bridge (W6), Tooreenbrien Bridge (W36) and Anglesey Bridge (W53)
GC_OCM_18: Horizontal Directional Drilling at W8 and W9

5.2.2.3.4 Road / Lane Closures along the Public Road Network

Traffic management around the construction works along the public road network will be managed along most of the route of the 110kV UGC with one-lane closures. However, due to the narrow nature of some of the roads along the route, a number of roads will need to be closed for between c.1 week and 1 month.

Road Closures: The following roads will be closed to facilitate the works:

- L6013-0 at Foildarrig / Oakhampton (c.3 weeks)
- L6009-0 at Castlewaller / Carrowkeale / Derryleigh (c.1 month)
- L6188-0 at Knockmaroe (c.1 week)

The closure will not be continuous throughout a given day, but will occur during daylight hours but outside of local peak or important traffic periods. There are alternative traffic routes to avoid the works available on all of these roads.

All road closures will be subject to Road Closure Licence application to Tipperary County Council; will be carried out in accordance with the Department of Transport, Tourism & Sport Guidelines for Managing Openings in Public Roads (April 2017); and will be subject to the Traffic Management Plan, as set out in Volume D: UWF Grid Connection Environmental Management Plan.

One lane closures: The works on the R503 between the Newport GAA Club and the turnoff for the windfarm substation at Knockmaroe, and the other local roads (L2166-10 at Coole, L2156-0 at Rockvale, L2157-0 at Rockvale, and L2264-50 at Knockmaroe), will be facilitated with one-lane closures. Traffic flow will be maintained using a stop/go system with flagmen. It is planned to operate up to 3 construction work crews at different locations simultaneously on the R503, the road work locations will be typically 2km to 3km apart. Only one work crew will be deployed on individual local roads, at any one time.

Maintaining Access to Properties: Where works take place in the vicinity of a property entrance (house/farms/businesses/sports facilities), traffic flow will be maintained by placing a steel plate over the 110kV UGC trench to allow traffic to pass over.

Relevant Volume C3 EIAR Figures:

Figure GC 5.21: Location of Road Closures and One-Lane Closures along the 110kV UGC

5.2.2.3.5 Disposal of Spoil from Public Road Excavations Trenches

The excavated material from the 110kV UGC trenches in the public road will be all be removed to licensed waste facilities as follows:

- Of the c.2,740 m^3 of bitumen bound surface dressing, c.2650m^3 will be removed to a licensed waste facility such as Kellys of Fantan, or other appropriately licensed facility. The remaining c.90m^3 relates to *potentially* contaminated material, where this material is excavated within 15m of invasive species infestations (*see point 3 below*).
- Of the c.1,830 m^3 of base layer aggregate, c.16,450m^3 of subsoil, and c.2360m^3 of rock, of these totals c.1770m^3, c.15900m^3 and c.2300m^3 respectively will be disposed of as spoil and will be removed to a licensed waste facility such as Kellys of Fantan, or other appropriately licensed facility. The remaining c.60m^3, c.550m^3 and c.60m^3 respectively relates to *potentially* contaminated material, where this material is excavated within 15m of the confirmed invasive species infestations, (*see point 3 below*).
- C.760m^3 of excavated material, will comprise c.90m^3 of bitumen bound surface dressing, c.60m^3 of base layer aggregate, c.550m^3 of subsoil and c.60m^3 of rock, being the material excavated within 15m of the confirmed invasive species infestations along the route of the 110kV UGC. This material will be classified as potentially contaminated and will be removed to Enva or other suitably licensed facility. The locations of these infestations were found during surveys and are identified on mapping within the Invasive Species Management Plan, part of the UWF Grid Connection Environmental Management Plan (Volume D). To ensure that all infestations are managed under the Invasive Species Management Plan, the occurrence and extent of infestations will be confirmed by an invasive species specialist prior to the commencement of construction works. See also Section 5.4.3.4.

5.2.2.3.6 Reinstatement of Public Roads

Along the 110kV UGC route on the public road, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken. The road pavements/built surfaces will be reinstated according to the conditions of the Road Opening Licence, and will involve a combination of carriage lane reinstatement and full road reinstatement, per:

Reinstatement of Trenches: The construction works will proceed in a linear manner with on average 80m to 100m completed at each location, each day. At the end of each day, the completed sections will be reinstated

with a temporary surface for road safety and trench integrity purposes. Full permanent reinstatement of the road surface/built surface will take place at the end of construction works.

Reinstatement of Joint Bays: Joint Bays are temporarily reinstated more than once; after the joint bay is constructed; after cable pulling; and after cable jointing. Following the electrical commissioning, the road surface/built surface over the Joint Bays will be permanently reinstated.

Trenches within road pavements will be reinstated in accordance with the Department of Transport, Tourism & Sport *Guidelines for Managing Openings in Public Roads* (April 2017).

Relevant Volume C3 EIAR Figures:

Figure GC 5.14: Cross Section of 110kV UGC in the Public Road

5.2.2.3.7 Phasing of the Works

In addition to the scheduling of works outlined in Section 5.3.13, as requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.

5.2.2.3.8 Supervision of Road Works

In addition to the supervision of works outlined in Section 5.2.3, as requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the Promoter will fund the costs of Tipperary County Council engaging a chartered Civil Engineer to oversee quality control and compliance with drawings, specifications and road opening conditions for the duration of the works.

5.2.2.3.9 Existing Underground Services along the 110kV UGC

All works outside the Mountphilips Substation site will be carried out within road pavements/built surfaces.

Underground services, including water pipes, communication cables and electricity cables along the 110kV UGC route, have been identified and mapped, (See Figures for Chapter 14: Material Assets (Built Services) in Volume C3 EIAR Figures). There are public water pipes under most of the roads to be used for the 110kV UGC. No waste water pipes were identified in the vicinity of the works during surveys. Before construction, the services owners will be consulted and confirmatory surveys would be carried out ahead of works. This will be done in full consultation with the service owners, including the Newport Regional Water Supply office in Newross. In addition, the services will be protected by the supervision by a banksman during excavation works, and a stock of repair materials will be kept at active works locations along the public road.

5.2.2.3.10 Transition from public road to private paved road at Knockcurraghbola Commons

At the eastern end of the 110kV UGC, the route is along the public road L6188-0 and then along a private paved road to the Consented UWF Substation location. This private road is paved, similar to the public road, including at its junction with the public road. There is no requirement to widen this junction to install the 110kV UGC. The junction of the private paved road with the public road does not required any widening or sightline works. It already has the required sightlines of 70m, which satisfies the sightline requirements as set out in Table 10.1 of the North Tipperary County Development Plan 2010 (as amended).

Relevant Volume C3 EIAR Figures:

Figure GC 5.26: Plan View of 110kV UGC at junction of L6188-0 with private paved road in Knockcurraghbola Commons

5.2.3 Environmental Protection Measures (Mitigation Measures)

The design of UWF Grid Connection includes the Project Design Environmental Protection Measures (Mitigation Measures) as per the schedule listed on Table 5-1, which were devised to avoid, prevent or reduce likely or potentially significant effects on the environment.

Table 5-1: Schedule of Environmental Protection Measures (Project Design Mitigation Measures)

PD ID	UWF Grid Connection Project Design Environmental Protection Measure (PD)
PD01	UWF Grid Connection construction works during the Hen Harrier breeding season (March to August inclusive) will only take place at the Mountphilips Substation Site; construction of the 110kV UGC between the Mountphilips Substation site and the Consented UWF Substation compound will be carried out during the months of September to February inclusive.
PD02	If works at Mountphilips Substation site are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory Hen Harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the entire construction works area boundary. These surveys will be completed prior to the start-up of all construction activities. No works will take place within 2 km of any identified active Hen Harrier nest during the hen harrier breeding season.
PD03	Although no hen harrier roosts are currently known to occur within 1km of UWF Grid Connection, confirmatory surveys will be completed to record any roosting locations within 1km of UWF Grid Connection. Should a hen harrier roost occur within 1km of UWF Grid Connection works, then construction works within 1km of a roost will be limited to the period between 'one hour after sunrise' to 'one hour before sunset' during the Hen Harrier roosting season (October to February inclusive).
PD04	All construction works will be carried out during daylight hours.
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).
PD06	Construction works will not be carried out within 150m of Rear Cross National School or Lackamore National School, during school hours. In addition, the project Community Liaison Officer will keep each school informed of construction timetables and scheduling.
PD07	110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads.
PD08	Confirmatory consultations with Irish Water, Eir and ESB and review of all relevant infrastructure mapping before works, along with confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a banksman will accompany each excavator to oversee all excavation works.

PD09	Close contact with the local Newport Regional Supply office at Newross will be maintained by the Environmental Clerk of Works throughout the construction of the 110kV UGC. The Environmental Clerk of Works will keep the Newport Regional Water Supply office up-to-date with the location and schedule of works. To reduce risk of damaging water mains; pre-construction confirmatory surveys will be carried out, and excavations will be hand dug within 500mm of pipes. So that any damage (should it occur) can be fixed immediately, a supply of water mains repair materials will be kept at the Mountphilips Substation compound and at each works location on the public road network.
PD10	Flag-men will be used at 110kV UGC works locations on the public roads subject to one lane closures. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the public road network in a in a safe and efficient manner. The works will be carried out according to the Traffic Management Plan for UWF Grid Connection. The Traffic Management Plan forms part of the Environmental Management Plan.
PD11	Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m.
PD12	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.
PD13	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the Promoter will fund the costs of Tipperary County Council engaging a chartered Civil Engineer to oversee quality control and compliance with drawings, specifications and road opening conditions for the duration of the works
PD14	All initial groundworks within 500m of an RMP or NIAH site, will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works.
PD15	Where excavations occur at culvert replacement locations along the 110kV UGC, and at the 3 No. new watercourse crossing at the Mountphilips Substation site, excavations will be monitored by an appropriately qualified archaeologist under license from the National Monuments Service, the excavated material will be examined for any evidence of archaeological material and metal detected as part of a finds retrieval strategy.
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.
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.
PD51	The sections of the 110kV UGC trench within the R503, in the central part of the 110kV UGC where the adjacent lands comprise predominantly peaty soils, will be lined with a geotextile membrane which will provide support to the cables trench and the road structure.
PD52	Confirmatory surveys for active Otter holts and breeding activity will be carried out 150m upstream and downstream of watercourse crossing locations including those watercourses evaluated as unsuitable for Otter in the current appraisal.
PD53	All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer and outside of 1 hours after sunrise or before sunset during winter.
PD54	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken while breeding females or cubs are present in the holt and NPWS will be notified immediately
PD55	No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand will not take place within 15m of such holts, except under license.
PD56	The prohibited area associated with otter holts, should they be located in confirmatory surveys, will, where appropriate, be protected from any inadvertent disturbance from any works or personnel occurring nearby such as at a bridge and declared as 'Ecology Restriction Zone' with no mention of otters to any onsite staff. Appropriate awareness of the purpose of the excluded area will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each possible access point. All contractors or operators on site will be made fully aware of the procedures pertaining to Ecology Restriction Zones and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
PD57	All excavation works will take place in line with protective measures required to avoid damage to trees during the construction phase of road projects, as stipulated in the NRA document 'Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub prior to, during and post construction of National Road Schemes'. This will include consultation with a qualified arborist, where appropriate to ensure works within the Root Protection Area (RPA) avoid any significant damage to tree roots. Exposed tree roots will be protected where required and excavation methods will be appropriately undertaken so as to avoid damage to RPA's. All excavation works in the RPA will be overseen by the Project Ecologist.

PD58	Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season *i.e.* not during the period of March to August inclusive. This includes hedgerow and scrub removal in addition to hedgerow trimming.
PD59	Works will not take place at any bridge during the Dipper breeding season (Feb-June inclusive) without a confirmatory survey to determine Dipper presence or absence. If Dippers are present, where possible works will not proceed until breeding has completed. All works at these and other bridges will be overseen by a project ecologist to ensure the requirements of the Wildlife Acts are being met. During culvert replacement works at W13, a Dipper nest box will be fitted to the new crossing structure. Additional nest boxes (c.10) will be provided for Dipper at suitable bridges to provide a net gain for this species.
PD60	Where works will be carried out at parapet walls, no works will take place between the period April-August without confirmatory survey as to the presence or absence of breeding Grey Wagtail. If breeding Grey Wagtail is present, then works will be overseen by a suitably qualified ecologist to ensure no effects occur to Grey Wagtail present in adherence to the requirements of the Wildlife Act. Works at all bridges will be overseen by the project Ecologist. Nest boxes (c.10) will be provided for Grey Wagtail at suitable bridges to provide a net gain for this species.
PD61	Works will not take place at any bridge during the Kingfisher breeding season (March to July inclusive) without a confirmatory survey to determine the presence of nesting Kingfisher within 150m upstream or downstream of the bridge. If nesting Kingfishers are present, works will not proceed until breeding has completed.
PD62	All bridges/structures where works are proposed will be subject to confirmatory surveys for General breeding birds prior to works commencing. All works will be supervised by the project Ecologist.
PD63	All construction works will be carried out during daylight hours. Security lighting will be used at the temporary compound at Mountphilips Substation site. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.
PD64	Tree felling only pertains to the Mountphilips Substation site. Confirmatory surveys will be carried out at all trees that will require felling or other major modifications (e.g. removal of rotten branches) in order to confirm the findings of the 2016 / 2017 surveys regarding the suitability of the trees for roosting bats. These trees will be subject to a ground-level visual inspection by the Project Ecologist (or a bat specialist acting on their behalf) prior to site clearance works.
PD65	While it is not expected that any trees with high suitability for roosting bats will be felled, the following measures will be implemented where a tree with moderate or high bat suitability is to be felled: a presence/absence bat surveys will be carried out; Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November. Trees with low suitability for bats will be felled carefully and slowly in order to avoid impact-related injuries to any bats that may be roosting inside them. Sections of the tree with potential roost features for bats (e.g. crevices, damaged branches) will be cut in sections, lowered carefully to the ground and left undisturbed for 48 hours before removal; and Where the felling of trees with bat suitability is carried out, robust, weather-proof bat-boxes, for example Schwegler type 1FF and 2F models, will be placed in each of the affected sections to compensate for the loss of potential tree roosts. The number of bat boxes will match the number of trees with bat suitability to be felled. Bat boxes will be placed on an exposed section of tree trunk at a minimum height of 4-5m, providing a clear space in front of the box for bats to enter and exit. Boxes will be placed in locations that will receive at least 6-7 hours of sunlight during summer months,

	and will be placed on the southern side of the tree. The Project Ecologist will supervise the installation of bat boxes in order to ensure that they are sited appropriately.
PD66	All bridges of moderate suitability for bats will be subject to a confirmatory survey prior to the commencement of construction works. Bridges of negligible or low suitability do not need to be surveyed, but this will be reviewed by the Environmental Clerk of Works and Project Ecologist. If a bat roost is found, the Project Ecologist will review the proposed works at that bridge, and determine whether there could be a risk of impacts on the roost. If there is a risk of impact on a bat roost in a bridge, the Project Ecologist will develop a case-specific mitigation strategy and apply to the NPWS for a derogation licence. Bats will be excluded from the bridge for the duration of construction works (typically only a few days), and replacement roosting opportunities (i.e. wall-mounted bat 'tubes' or boxes) will be provided at a suitable location nearby. When construction work is complete, bats will be able to return to their former roosting site.
PD67	No badger setts were recorded within 50m of the UWF Grid Connection during pre-planning surveys. Confirmatory surveys will be carried out within 50 m of either side of the construction works area boundary to determine if any new setts have been established in the intervening period following initial pre-planning surveys and the commencement of construction activity. These confirmatory badger surveys will be undertaken no more than 12 months in advance of proposed construction activities, during the period November and April when vegetation cover is reduced. Should a badger sett be confirmed, the following measures will be implemented: NWPS will be notified immediately of any new active setts which are located within 50 meters of the footprint of the development; If sett exclusion is required, this will be undertaken by an experienced ecologist under the necessary license and following best practice guidance (NRA, 2005); No construction works will be carried within 50m of an active badger sett during the main breeding season (December 1st to June 30th); and Construction activity in the environs of an active badger sett outside of the breeding period will follow NRA (2005) guidelines, i.e. no heavy machinery will be used within 30m of badger setts (unless carried out under license); lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand will not take place within 10m of sett entrances.
PD68	As amphibians and reptiles will use brash piles for refuge and hibernation, all logs/brash created from hedgerow/tree removal at the Mountphilips Substation site will be removed off site immediately to prevent disturbance to amphibians/reptiles which may use brash piles if left in situ.
PD69	All covering of vegetative invasive knotweed infestations with high density polyethylene grass carpet terram will take place, at all identified locations prior to any works commencing on UWF Grid Connection or any other element of the Whole UWF Project. The covering of infestations will be completed on sections seven days in advance of works occurring on those sections. The infestations will be covered so that their full extent plus 1 metre is covered entirely and no vegetation is visible. The covering of these infestations will only be carried out under the direct supervision of an ecologist with prior experience of this type of work i.e. this work cannot be carried out by any general construction staff. No posts will be used to secure the coverings i.e. there will be no ground interference during any of these operations.

5.2.3.1 Environmental Management Plan

An Environmental Management Plan (EMP) is appended to the EIA Report as Volume D. The purpose of the EMP is to communicate environmental control measures that apply to the development of the UWF Grid Connection to those with responsibility for carrying out works on site so that any likely significant adverse effects of the development on the receiving environment can be prevented.

The UWF Grid Connection Environmental Management Plan includes the Project Design Environmental Protection Measures (Mitigation Measures) per the Schedule at Table 5-1 above, along with a Traffic Management Plan, Waste Management Plan, Surface Water Quality Management Plan and Invasive Species Management Plan.

In addition, Environmental Emergency Procedures, Scheduling and Timing of Works Measures, Environmental Survey Requirements, Best Practice Measures and the Outline Construction Methodologies are included in the Environmental Management Plan.

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 Contractor will be contractually obliged to comply with the requirements of the Environmental Clerk of Works to ensure that the EMP is implemented.

See: **Volume D: UWF Grid Connection Environmental Management Plan**

5.3 Life Cycle Stages of the UWF Grid Connection

5.3.1 Construction Stage - UWF Grid Connection

5.3.1.1 Overview of the Construction Process

The construction process for the UWF Grid Connection is a relatively straightforward civil build. Construction personnel will work on a number of crews or teams, with one crew working at the Mountphilips Substation compound and a number of crews at different locations along the route of the 110kV UGC.

The workers will arrive and depart daily to and from the temporary compound at Mountphilips Substation site, parking spaces will be provided at the temporary compound. The various crews will then be transported to the specific works location by means of 'crew-cab' 4x4 vehicles or similar.

Bulk deliveries of materials will be delivered to the temporary compound and stored there until needed. Materials needed at works locations will be transported from the Temporary Compound by way rigid body vehicle or tractor and trailer.

Aggregate and concrete will be delivered directly to works locations.

5.3.1.2 Construction Works Area Boundary

All construction works will take place within the construction works area boundary.

The **'**Mountphilips Substation site' located in the townlands of Mountphilips and Coole, consists of the area between the End Masts and the widened site entrance off the public road, and includes the proposed Mountphilips Substation Compound, End Masts, new access road, permanent entrance, the ancillary works and the western extent of the 110kV UGC within this area.

The construction works area boundary at the Mountphilips Substation site will be an area larger than the permanent footprint, as delineated on Figure GC 5.2: Layout of the Mountphilips Substation Site on Aerial Photography Mapping.

Outside of the Mountphilips Substation site, all 110kV UGC works will be carried out entirely in (or from) the road pavement/built environment, and with the exception of culvert replacement works, the construction works area boundary will not extend into the verges/natural environment. At culvert replacement works location; a minimal area of roadside vegetation may be required to be cleared, and then reinstated, to facilitate the replacement of the culvert. However, all works will take place from the road pavement.

Relevant Volume C3 EIAR Figures:

Figure GC 5.2: Layout of the Mountphilips Substation Site on Aerial Photography Mapping

5.3.1.3 Duration & Timing

The construction of UWF Grid Connection is expected to commence in 2020/2021. The main construction period will take 12 to 18 months to complete. The construction timetable is detailed in Table 5-2;

Table 5-2: Duration and timing of the construction of UWF Grid Connection

Construction Activities	Duration of the Construction Stage	Timing of Construction Activities
Pre-Construction - detailed design, confirmatory surveys, vegetation clearance etc.	3-6 months	Immediately prior to the commencement of the main construction period, or where seasonal timing is relevant to pre-confirmatory surveys or habitat works – during the appropriate season prior to works in the relevant sections of UWF Grid Connection
Main Civil and Electrical Construction Activities at Mountphilips Substation site: Construction of Mountphilips Substation, Ancillary Works for Mountphilips Substation and 110kV UGC works at the Mountphilips Substation site.	10-12 months	Projected Start Date: 2020/2021
Main Civil and Electrical Construction Activities for the 110kV UGC outside the Mountphilips Substation site on Public Roads and private paved road to the Consented UWF Substation, including cable jointing at Joint Bay Locations.	10-12 months in total, over an 18 month period.	Projected Start Date: 2020/2021
Electrical commissioning activities at Mountphilips Substation	5 months at Mountphilips Substation, 1 month for the 110kV UGC at Joint Bay locations along the route	Commissioning will take place after the Main Construction are complete.

The duration of works provided are approximate and may be shorter or longer, depending on the final number of crews used, weather conditions etc. A formal programme of works will be prepared by the appointed Contractor prior to the commencement of construction activities.

5.3.1.3.1 Construction Hours of Work

Normal construction times will be daylight hours between 07.00 to 19.00hrs Monday to Friday and 08.00 – 16.30hrs on Saturdays.

5.3.1.3.2 Scheduling of Works

To protect residential amenity, surface water quality and biodiversity, the following timing or scheduling of works will be implemented during the Construction Stage:

- PD01: UWF Grid Connection construction works during the Hen Harrier breeding season (March to August inclusive) will only take place at the Mountphilips Substation Site; construction of the 110kV UGC between the Mountphilips Substation site and the Consented UWF Substation compound will be carried out during the months of September to February inclusive;
- PD02: If works at Mountphilips Substation site are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory Hen Harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the entire construction works area boundary. These surveys will be completed prior to the start-up of all construction activities. No works will take place within 2 km of any identified active Hen Harrier nest during the hen harrier breeding season;
- PD03: During the Hen Harrier roosting season (October to February inclusive), construction works within 1,000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset;
- PD04: All construction works will be carried out during daylight hours;
- PD06: Construction works will not be carried out within 150m of Rear Cross National School or Lackamore National School, during school hours. In addition, the project Community Liaison Officer will keep each school informed of construction timetables and scheduling;
- PD07: 110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads;
- PD11: Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m;
- PD12: As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town;
- 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 new cross structure works), to be carried out within 50m of a watercourse, at any one time;
- 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;

- PD31: Works to bridge parapet walls at watercourse crossings W7, W36, W53 will be carried out during dry weather;
- PD32: 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);
- 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);
- PD53: All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer and outside of 1 hours after sunrise or before sunset during winter;
- PD54: If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken *while breeding females or cubs are present in the holt* and NPWS will be notified immediately;
- PD58: Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season *i.e.* not during the period of March to August inclusive. This includes hedgerow and scrub removal in addition to hedgerow trimming;
- PD59: Works will not take place at any bridge during the Dipper breeding season (Feb-June inclusive) without a confirmatory survey to determine Dipper presence or absence. If Dippers are present, where possible works will not proceed until breeding has completed;
- PD61: Works will not take place at any bridge during the Kingfisher breeding season (March to July inclusive) without a confirmatory survey to determine the presence of nesting Kingfisher within 150m upstream or downstream of the bridge. If nesting Kingfishers are present, works will not proceed until breeding has completed.
- PD63: All construction works will be carried out during daylight hours. Security lighting will be used at the temporary compound at Mountphilips Substation site. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.
- PD65: While it is not expected that any trees with high suitability for roosting bats will be felled, the following measures will be implemented where a tree with moderate or high bat suitability is to be felled: Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November.
- PD67: No badger setts were recorded within 50m of the UWF Grid Connection during pre-planning surveys. No construction works will be carried within 50m of an active badger sett during the main breeding season (December 1st to June 30th).

5.3.1.3.3 Construction Personnel

It is expected that up to 100 No. persons will be involved in the pre-construction, main construction, cable jointing and commissioning works, broken down as follows:

- c.15 No. persons will be involved in pre-construction activities both on and off-site,
- The construction of the Mountphilips Substation will require c.20 construction workers,
- The construction of the Mountphilips – Upperchurch 110kV UGC will require c.35 construction workers during the construction of the 110kV UGC, organised in 4 No. crews,
- Security and canteen services will require c.12 personnel,
- Cable pulling will involve c.4 personnel organised in 2 No. cable pulling crews,
- Jointing works will involve c. 6 No. personnel in total, organised in 3 jointing crews and
- 8 No. electrical commissioner's personnel, for commissioning and energisation.

5.3.1.3.4 Welfare Facilities

Self-contained temporary welfare facilities will be provided in the construction site Temporary Compound at the Mountphilips Substation site, with single self-contained portable toilets provided at active works locations along the 110kV UGC.

Relevant Volume C3 EIAR Figures:

Figure GC 5.8 – Plan View of the Temporary Construction Compound at Mountphilips Substation

5.3.1.4 Construction Stage Activities

Outline construction methodologies (OCMs) based on standard construction methods, have been prepared for all of the main construction stage activities. These OCMs are listed in the table below, the full text for each OCM is included in Appendix 5-1: Outline Construction Methodologies and Best Practice Measures.

Table 5-3: Outline Construction Methodologies for UWF Grid Connection

OCM Ref:	OCM Title
GC_OCM_01	Pre-Construction Activities
GC_OCM_02	Mountphilips Substation Compound
GC_OCM_03	New End Masts west of Mountphilips Substation
GC_OCM_04	Temporary Access Road to End Masts
GC_OCM_05	Instream Works and Temporary Bailey Bridge Crossing At W1
GC_OCM_06	New Permanent Access Road at Mountphilips Substation Site
GC_OCM_07	Installation of 110kV UGC and new crossing structures at W2 and W3
GC_OCM_08	Permanent Site Entrance at Mountphilips Substation Site
GC_OCM_09	Temporary Compound at Mountphilips Substation Site
GC_OCM_10	Formation of Overburden Storage Berms at Mountphilips Substation Site
GC_OCM_11	Reinstatement of Lands at Mountphilips Substation Site
GC_OCM_12	110kV Trenching & Ducting
GC_OCM_13	110kV Joint Bays and Associated Chambers
GC_OCM_14	110kV Cable Pulling
GC_OCM_15	110kV Cable Jointing
GC_OCM_16	Replacing existing culverts along the 110kV UGC
GC_OCM_17	Raising road level and parapet walls at Rockvale Bridge (W6), Tooreenbrien Bridge (W36) and Anglesey Bridge (W53)
GC_OCM_18	Horizontal Directional Drilling at W8 and W9

The full text for each OCM is included in Appendix 5-1: Outline Construction Methodologies and Best Practice Measures, and also in Volume D Tab7 and Tab10: UWF Grid Connection Environmental Management Plan (EMP).

In the OCMs, a brief description of the work involved; the duration of this work; personnel, machinery, equipment and tools requirements; construction materials; details of the standard methodology for the construction activities are set out.

The final Method Statements for the construction works will be developed by the appointed Construction Contractors and will be based on the OCMs listed above and included in full in Appendix 5.1.

5.3.1.5 Use of Machinery and Equipment

The main machinery, equipment and tools which will be required during the construction stage are listed in Table 5-4 (the list of machinery, equipment and tools which will be used for each of the main construction activities are set out in the Outline Construction Methodologies in Appendix 5.1).

Table 5-4: Construction machinery, equipment and tools

Construction Machinery	Construction Equipment and Tools
1 No. 90/200 tonne crane	1 No. Cement Mixer
6 No. 12 tonne excavators	6 No. De-Watering pumps
6 No. 6 tonne excavators	6 No. water pumps and associated pipes
6 No. dump trucks	6 No. Diesel generator
6 No. vibrating roller	Hand tools
1 No. 14 tonne roller	Sand bags
6 No. large vans	Silt traps and silt fences
1 No. Tarring vehicle	Oil absorbent booms
2 No. Cable Pulling machines	5 No. siltbuster units/sediment tanks and skips
Jointing Containers	Wooden fence stakes and wooden fencing rails

The Health and Safety Authority (2019) Code of Practice for Avoiding Danger from Overhead Electricity Lines will be implemented as part of standard practices safety practices for construction machinery.

5.3.1.6 Use of Hydrocarbons

Hydrocarbons will be used on-site during construction activities and will be limited to the diesel or petrol fuel and mechanical oils used by the site vehicles and machinery, delivery vehicles and any mobile generators used.

Grease may also be used to line the cable ducts to aid in cable pulling during the construction stage.

5.3.1.7 Other Facilities - Fuel Storage & Tool Storage

All fuels required for 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. Overnight parking of plant and machinery will only be permitted at designated sites along the route where there is a hardcore surface in place.

Tools and smaller pieces of equipment will be stored in locked containers, at the Temporary Compound, during the construction stage.

5.3.1.8 Imported Construction Materials

The construction materials, which will be brought onto the UWF Grid Connection site, are listed in Table 5-5 along details of the quantity and source of the materials.

Table 5-5: Quantities, type and source of construction materials

Materials	Quantity	Source of Materials
Concrete	10,870m³ / 1360 No. loads	Roadstone Killough, Co Tipperary Roadstone Bunratty, Co Clare
Aggregate (crushed stone and sand)	16,220m³ / 1350 No. loads	Rear Cross Quarry, Shanballyed-mond, Rear Cross Co Tipperary
Surface dressing (public road sections)	2,250m³ / 210 No. loads	Oranmore, Co. Galway
Lattice towers (End Masts)	4 No. loads	Cork
Electrical cabling and plant	5 No. loads	EU
Switchgear	5 No. loads	EU
Communication cabling and equipment	2 No. loads	EU
Joint bay chamber and cover	10 No. loads	Offaly
Communication chamber and cover	5 No. loads	Offaly
Link Box Chambers and cover	5 No. loads	Offaly
Earth Sheet Link Boxes and connections	5 No. loads	UK
Duct jointing collars and draw ropes	5 No. Loads	Cork
Profiles for ducting and chambers	5 No. Loads	Cork
HDPE Ducting	140 No. loads	Cork
HDPE Comms Ducting	80 No. loads	Cork
110kV electrical cable	29 No. loads	Cork
Fibre Optic communication cables	5 No. loads	Cork
Red cable protection strip	1 No. loads	Cork
Yellow warning tape	1 No. loads	Cork
Steel protection plate	1 No. loads (if required)	Birr, Co Offaly
Marker posts and plates	1 No. load	Dundrum, Co Dublin
General building materials	11 No. loads	Various Irish Suppliers
Control Building doors	1 load	Tullow, Co Carlow
Reinforcing Steel	5 No. loads	Various Irish Suppliers
Geotextile material	2 No. loads	Nenagh
Hedging and tree species	1 No. load	Established nurseries in Ireland
Fencing materials, posts, rails, wire	1 No. load	Arrabawn Co-Op, Reiska

5.3.1.8.1 Delivery Vehicles – Axles

Delivery machinery will comprise of standard 4-axel rigid tipper units for aggregate and concrete deliveries and tractor units with 2-4 axel articulated flat-beds or tautliner for other material deliveries. Smaller parts may be delivered using vans and car trailers.

5.3.1.8.2 Material and Delivery Traffic Haulage Route

The delivery of construction materials will be managed in the following manner:

Aggregate, Concrete and Road Surface Dressing

Aggregate, concrete and public road surface dressing will be delivered directly to construction works areas. The HGVs delivering this material will travel to the works areas along both the regional and local road networks, using the haul routes specified in Figure GC 5. 22 - Haul Routes for Aggregate and Concrete Deliveries

Other Construction Material

Other materials, such as ducting, geotextile and other construction materials, will be sourced from various suppliers and will be transported to the Temporary Compound, at Mountphilips Substation site, via the national and regional road network. These materials will be stored at the Temporary Compound until required at works areas. Each day a smaller truck will be used to deliver the daily volume of ducting, cable protection strip, warning tape, duct jointing collars etc. to each active works area.

Relevant Volume C3 EIAR Figures

Figure GC 5.8 - Plan View of the Temporary Construction Compound at Mountphilips Substation
Figure GC 5.22- Haul Routes for Aggregate and Concrete Deliveries

5.3.1.9 Traffic Management

5.3.1.9.1 Public Road Use

The following public roads will be used by the development of the UWF Grid Connection works and associated haulage;

- **Regional Road R503** and
- **Local Roads** (designated as "L" Roads); L2166-10, L6013-0, L2156-0, L2157-0, L6009-0, L5337-1, L2264-50, L6188-0.

With the exception of the L5337-1 at Tullow Newport, all of these roads will be subject to trenching and joint bay excavation works for the 110kV UGC.

The L6013-0 will not be used as a haulage route from the Mountphilips Substation Site (location of the temporary construction compound) to the L2156-0, L2157-0 and L6009-0 during installation of the 110kV UGC along these roads. Rather traffic from the temporary construction compound at Mountphilips Substation site will use the L2166-10, through Newport town and then the L5337-1 at Tullow to access the L2156-0, L2157-0 and L6009-0 works, thus avoiding the L6013-0 entirely.

5.3.1.9.2 Road / Lane Closures along the Public Road Network

Traffic management around the construction works along the public road network will be managed along most of the route of the 110kV UGC with one-lane closures and stop/go systems. However, due to the narrow nature of some of the roads along the route, a number of roads will need to be closed for between c.1 week and 1 month.

Road Closures: The following roads will be closed to facilitate the works:

- L6013-0 at Foildarrig / Oakhampton (c.3 weeks)
- L6009-0 at Castlewaller / Carrowkeale / Derryleigh (c.1 month)
- L6188-0 at Knockmaroe (c.1 week)

The closure will not be continuous throughout a given day, but will occur during daylight hours but outside of local peak or important traffic periods. There are alternative traffic routes to avoid the works available on all of these roads.

One lane closures: The works on the R503 between the Newport GAA Club and the turnoff for the windfarm substation at Knockmaroe, and the other local roads (L2166-10 at Coole, L2156-0 at Rockvale, L2157-0 at Rockvale, and L2264-50 at Knockmaroe), will be facilitated with one-lane closures. Traffic flow will be maintained using a stop/go system with flagmen. It is planned to operate up to 3 construction work crews at different locations simultaneously on the R503, the road work locations will be typically 2km to 3km apart. Only one work crew will be deployed on individual local roads, at any one time.

5.3.1.9.3 Road Licences

All road closures will be subject to Road Closure Licence application to Tipperary County Council; will be carried out in accordance with the Department of Transport, Tourism & Sport Guidelines for Managing Openings in Public Roads (April 2017); and will be subject to the Traffic Management Plan, as set out in Volume D: UWF Grid Connection Environmental Management Plan.

5.3.1.9.4 Maintaining Access to Properties

Where works take place in the vicinity of a property entrance (house/farms/businesses/sports facilities), traffic flow will be maintained by placing a steel plate over the 110kV UGC trench to allow traffic to pass over.

5.3.1.9.5 Engagement with Local Residents

Contact will be maintained with local residents on the day to day timing of the works. A Community Liaison Officer (CLO) will be appointed as the point of contact between the Promoter, the local community and the wider public. The CLO will keep very active contact with local residents on the traffic arrangements around the works day to day.

5.3.1.9.6 Flagmen at Road Works

Flagmen will be employed at road work locations to control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.

5.3.1.9.7 Signage for Road Works

Informational signage will be erected to provide an overview of the construction traffic timetable; the Environmental Clerk of Works contact number, the Community Liaison Officer and will serve as an advance warning to expect HGVs on the road. These signs will be provided at the Mountphilips Substation site entrance;

Rear Cross village, at Derryleigh on the local road near the junction with the R503, and at Knockmaroe on the local road near the junction with the R503.

Directional signage will be installed at specific locations along the haul routes. The haul routes for construction materials deliveries to the Mountphilips Substation site will have clear directional signs from Newport to the site. The haul routes for construction material deliveries to the works along the 110kV UGC will have clear directional signs and this signage will be relocated to indicate the location of the works as the works progress along the 110kV UGC route.

Advance warning signage will be erected on both approaches to road works locations. The placement of this signage has been designed based on the recorded 85th percentile traffic speeds, or the posted limit, whichever is the higher.

Relevant Volume C3 EIAR Figures:

Figure GC 5.23: Advance Warning Signage for Road Works on 50km/hr Roads.
Figure GC 5.24: Advance Warning Signage for Road Works on 80km/hr Roads

5.3.1.9.8 Traffic Management Plan

A Traffic Management Plan for UWF Grid Connection has been developed and will be a key construction contract document. The objective of the Traffic Management Plan is to control and minimise the traffic impacts of construction insofar as it may affect the road network, local residents and the travelling public on the public roads close to and adjacent to the construction site, through measures to maximise road safety while keeping traffic flowing as freely as possible.

The Traffic Management Plan details the traffic management measures to be undertaken on the public roads;

- at and on approach to road works locations;
- at and on approach to the site entrance at Coole for the Mountphilips Substation and the temporary compound;
- along the R503 and along local roads on the routes of concentrated construction traffic.

The **Traffic Management Plan** is appended to this EIA Report as part of Volume D: UWF Grid Connection Environmental Management Plan.

5.3.2 Operational Stage - UWF Grid Connection

5.3.2.1 Overview of the Operational stage of UWF Grid Connection

Following commissioning, the UWF Grid Connection will be taken in charge by ESB Networks and both the Mountphilips Substation and the Mountphilips – Upperchurch 110kV UGC will become part of the national electricity network. The new asset will be managed and operated by ESB Networks.

5.3.2.2 Duration and Timing of Operational Stage

Table 5-6: Duration and Timing of the Operation Phase of UWF Grid Connection

Description	Duration
Operation of the UWF Grid Connection	The UWF Grid Connection will be operated on a **permanent** basis by ESB Networks.
Mountphilips Substation: Routine Monthly Inspections (c.2hrs) Annual Maintenance Daily Remote Monitoring	c. 2hrs for monthly inspections c.2 days for annual maintenance - equates to a total of c.5 days per year associated with on-site inspections and maintenance.
110kV UGC: Annual Inspection and testing at Joint Bay link boxes Visual inspection of the lands over the 110kV UGC	Up to 8 days per year associated with inspections and testing carried out by a 2 man crew.
110kV UGC: Planned Maintenance of the 110kV UGC - Infrequent, if at all, during the lifetime of the Grid Connection, and expected to involve reopening of joint bay chambers to pull cables, with reinstatement of the road/built surface following works.	c.8 – 10 days per cable pulling activity: 2 days for cable pulling, 1 week for cable jointing 1 day for testing
110kV UGC: Unplanned Repair of the 110kV UGC – it is not expected that there will be any requirements for unplanned repairs to the 110kV UGC. However, in the unlikely event that repairs are required, they will be of a similar duration as the Planned Maintenance, above.	Same as for planned maintenance above

The duration of activities during the operational stage provided above are approximate and may be shorter or longer, depending on the work involved, number of crews/personnel, weather conditions etc.

5.3.2.3 Operational Personnel

It is expected that scheduled inspection and maintenance activities will be carried out by ESB Networks personnel (2 men crews) over a total of 13 days per year.

Very infrequent planned maintenance or unplanned repairs may be required, if at all, during the lifetime of the UWF Grid Connection, it is expected that one crew with c.6 ESB Networks personnel would be required for 1 week – 2 weeks duration, depending on the nature of the repairs work.

5.3.2.4 Operational Activities

5.3.2.4.1 Mountphilips Substation

Daily monitoring: The Mountphilips Substation will not be permanently manned, as the equipment will be operated by remote computer link which will be connected to the National Control Centre.

Monthly Inspection: will mainly involve the testing of the electrical equipment and apparatus and testing of the electrical, communications and control systems along with visual inspections of the Mountphilips Sub-station Compound and Control Building. The security and condition of the surrounding palisade fence and entrance gates, and the condition of the access road, drainage network and watercourse crossing structures will also be inspected during these monthly visits.

Monitoring of the communication cables will be carried out remotely.

Annual Maintenance: will involve testing of equipment, apparatus and systems, and may also involve the replacement of electrical parts within the Substation Compound or Control Building. All parts and tools will be brought into the Mountphilips Substation as required. Mobile generators and hoists may also be required for some maintenance activities.

5.3.2.4.2 Mountphilips - Upperchurch 110kV UGC

Annual Inspection: The electric cables will be inspected annually by ESB Networks. The annual inspection which will include checks, inspections and testing via the link boxes which will have been installed in a link box chamber at Joint Bays. The man-hole type cover over the link box chamber, which is at road surface level, will be removed to provide access to the link box within. Checks and testing of the electric cables will be carried out using hand held tools. The entire length of the 110kV UGC will also be visually inspected, by drive over of the route. Traffic management will be set up as required during inspections.

Planned Maintenance: The minimum lifecycle of the electrical cables and electric plant is 80 - 100 years in accordance with ESB Networks Specifications. As the cables will be factory tested to a high standard, sourced from ESBN approved suppliers and buried in a concrete enclosed trench in accordance with ESBN specifications, it is not expected that the cables will require replacement during their operational life. However, if any particular cable is found not to be performing to its specification, it will be scheduled for replacement.

Replacement of cables will involve the use of an excavator to remove the road surface and concrete covers from the top of the joint bay chambers at each end of the cable to be replaced. The sand inside the chambers is then removed and the cable joints opened. The cable can then be pulled out of its duct using a cable winch set up at one of the joint bays, and a new cable is then be pulled into the duct and jointed at both ends. The sand will then be backfilled into the chambers and the covers replaced and the road reinstated. Testing and commissioning in a similar manner to the construction phase will then be carried out. Traffic management will be set up as required.

Unplanned Repairs: It is not likely or expected that there will be any requirements for unplanned repairs to UWF Grid Connection during its operation. However, in the unlikely event that repairs are required, the associated activities and likely to be similar to the planned maintenance activities described above.

5.3.2.5 Use of Machinery and Equipment

The main machinery, equipment and tools which will be used during the operation of the UWF Grid Connection are listed in Table 5-7.

Table 5-7: Use of Machinery and Equipment during the Operation of the Grid Connection

Machinery	Equipment	Materials
Mountphilips Substation		
Van – equipped with any necessary hand tools and testing equipment	Hand tools	Replacement electrical or communication parts
Mobile Generator, and associated fuel	Testing equipment	Small volumes of sulphur hexafluoride (SF6) compressed gas
Mobile lifts – e.g. hoists, cherry pickers etc.	Equipment or apparatus for Mountphilips Substation for testing or maintenance	Small volumes of grease/oils
Mountphilips – Upperchurch 110kV UGC		
Vans equipped with an necessary hand tools and testing equipment	Jointing Containers for very infrequent Planned Maintenance or Unplanned Repairs	Replacement 110kV or communication cables and ancillary equipment
Excavator for any very infrequent Planned Maintenance or Unplanned Repairs	Testing equipment	Road surfacing material
Cable pulling winch and spool trailer and tractor for any very infrequent Planned Maintenance or Unplanned Repairs		

5.3.2.6 Use of Hydrocarbons

A small volume of hydrocarbons will be used on the UWF Grid Connection site during operational activities and is limited to the diesel or petrol fuel used by the site vehicles and machinery and any mobile generators used. Small volumes of oil and grease will be used during maintenance of electrical equipment the Mountphilips Substation.

5.3.2.7 Welfare Facilities

There will be no requirement for office facilities at the operational Mountphilips Substation. Self-contained toilet facilities, serviced by a rain water harvesting system will be installed at the Control Building.

Relevant Volume C3 EIAR Figures

Figure GC 5.6 – Plan and Elevation of the Control Building at Mountphilips Substation

5.3.2.8 Other Facilities - Fuel Storage & Tool Storage

Fuel Storage: There will be no requirement for fuel storage facilities during operations.

Tool Storage: There will be no requirement for tool storage facilities, all tools will be brought onto site as required.

5.3.3 Changes to UWF Grid Connection

Decommissioning: The UWF Grid Connection will remain permanently in place as part of the national electricity network and thus decommissioning is not envisaged.

5.4 Use of Natural Resources, Emissions & Wastes

5.4.1 Use of Natural Resources

5.4.1.1 Use of Resources: Land

5.4.1.1.1 Requirements for Land

Construction Land Requirement: Construction works areas on lands comprises 4.8ha of agricultural lands. Two of the landholdings are at the Mountphilips Substation site. The 3rd landholding relates to a grassland field at the eastern extremity of the 110kV UGC route where the already Consented UWF Substation will be located- construction works in this field will only be in the future compound area. The remaining construction works areas relate to public road/built environment which are not classified as a natural resource.

Operational Land Requirement: Once the Development is constructed, the requirement for lands will reduce considerably to 1.75ha, comprising the footprint of new permanent infrastructure within the Mountphilips Substation site only. The surrounding agricultural lands will be reseeded with grass and returned to agricultural grassland use.

Restoring Connectivity of Lands: Landholding access, at the Mountphilips Substation site, to lands on either side of the new access road, will be maintained in each of the four fields by the erection of gates along the boundary of the new access road, which will allow livestock and farm machinery to cross over the new access road.

Relevant Volume C3 EIAR Figures:

Figure GC 5.25 - Land Use

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_11: Reinstatement of Land at Mountphilips Substation site

5.4.1.2 Use of Resources: Biodiversity

5.4.1.2.1 Hedgerows, Trees and Earthen Banks

Hedgerows, trees and earthen banks occur at field boundaries at the Mountphilips Substation site. The removal of hedgerows and trees is limited to the construction stage and will be carried out outside of the bird breeding season.

160m of hedgerow and 18 trees (17 immature and 1 mature) will be removed at the substation site entrance to widen the entrance and provide sightlines. These will be reinstated by planting the equivalent amount of hedgerow and semi-mature trees behind the new sightlines.

40m of hedgerow and 11 immature trees will be removed to build the new access road. A new hedgerow, c.700m in length, will be planted on the berms on either side of the new Access Road between the Site Entrance and Mountphilips Substation for the benefit of biodiversity in the area.

All new hedging will be locally sourced native fruiting hedgerow species, and the replacement trees will be semi-mature native hedgerow species. A mix of local provenance native fruiting hedge species such as hawthorn, blackthorn, holly, hazel, guelder rose, spindle, crab apple, bird cherry, elder and buckthorn, will be used for new hedgerows at Mountphilips Substation site.

Following the completion of construction works the berms around the substation compound and the side of the berms along the new access road will be reseeded with grasses and wildflower species common to the surrounding vegetation. Local provenance native wildflower seed of flowering plants like clovers, vetches and knapweed will be included.

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_11: Reinstatement of Land at Mountphilips Substation site

5.4.1.2.2 Forestry

No felling of forestry is required for UWF Grid Connection.

5.4.1.2.3 Invasive Species

No invasive species were identified at the Mountphilips Substation site.

Preventing the disturbance of existing infestations of invasive plant species: 38 infestation sites have been identified on the 110kV UGC route on the public road. Construction works for the 110kV UGC will be strictly be carried out in the road pavements/built surfaces with no interference with the road verges, thus minimising the risk of spread of these species. Pre-construction confirmatory surveys will be carried out to identify and map the location/extent of infestations on the 110kV UGC route. To prevent the spread of invasive plant species: Infestations of knotweed will be covered with polyethylene grass carpet terram covering under the direct supervision of an invasive species specialist. All excavations from the 110kV UGC trench within 15m of an identified infestations will be disposed as potentially contaminated material, by a licenced contractor to a suitably licenced waste facility.

Preventing the importation of invasive plant species: To prevent the importation of invasive plant species, prior to arrival on site, all plant, vehicles and equipment which are involved in construction works will be thoroughly cleaned, all vegetative materials removed, steam cleaned at high-pressure with water hotter than 65 degrees Celsius and then let dry, before entering the site. Dedicated construction personnel will be trained in the inspection, and cleaning of delivery vehicles and the correct disposal of any adherent material,

To prevent the inadvertent importation of invasive animal species, plants and associated packaging will be checked for the presence/evidence of invasive animals such as the white toothed shrew at source and once against on arrival to the UWF Grid Connection works areas.

Preventing the spread of disease at watercourses: To prevent the spread of crayfish plague, residual water in any containers/vessels used in works near watercourses will be flushed with disinfectant (Virkon Aquatic) onto grass. All footwear used, or to be used, in watercourses will be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards.

An Invasive Species Management Plan will be implemented to prevent the spread of invasive species, this Plan is included in Volume D: UWF Grid Connection Environmental Management Plan.

5.4.1.3 Use of Resources: Water

5.4.1.3.1 Potable Water

During construction, there will be no requirement for an on-site well or mains water connection at the Mountphilips Substation site. Bottled drinking water will be stored in the canteen at the Temporary Compound, and will be carried in small volumes by each crew or other personnel working at locations away from the Mountphilips Substation site.

During operation, the demand for potable water will be very low, and, as the substation will only be occupied occasionally, bottled drinking water will be brought into the Mountphilips Substation, as needed.

5.4.1.3.2 Non-potable water

During construction, non-potable water for hand washing or toilet flushing will be imported to the Temporary Compound from a local municipal supply and stored in water holding tanks at the toilet block at the Temporary Compound. Non-potable water will also be stored in small water holding tanks in the single portable toilets, which will be located at works areas, along 110kV UGC route.

During operation, non-potable water for hand washing or toilet flushing will be supplied from a rainwater harvesting system which will be integrated into the Control Building at Mountphilips Substation during its construction (this mitigation measure is part of the design of the UWF Grid Connection and will avoid impacts to groundwater). The rainwater harvesting system will provide all of the water requirements for welfare facilities at the Mountphilips Substation during its operation, in line with sustainable water supply and for the protection of local groundwater features only. There are no requirements for such a measure arising as a requirement to avoid/reduce the likelihood of significant effects on European Sites, due to separation distance via hydrological pathways.

5.4.1.3.3 Drilling Activities

During the construction stage, some water will be required to cool the cutting head and aid in the removal of cut material from the bore hole during the drilling activities at the two watercourse crossings (W8 and W9) on the L6009-0 road at Castlewaller/Carrowkeale. This water will be sourced from a local municipal supply as required. Water used in the bore hole will be collected and removed for treatment in a licenced water treatment plant.

5.4.1.4 Use of Resources: Soils

5.4.1.4.1 Construction stage: Soils at Mountphilips Substation site

In total, approximately 5,300m^3 of soils will need to be excavated, comprising 4,060m^3 of topsoil, 1,200m^3 of subsoil and 30m^3 of rock.

5.4.1.4.2 Construction stage: Storage of Soils at Mountphilips Substation site

5,000m^3 of the excavated material will be permanently stored in linear berms along the new access road and around the Substation Compound and 300m^3 of the excavated topsoil will be used to reinstate within the works area at Coole/Mountphilips.

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_11: Reinstatement of Land at Mountphilips Substation site

5.4.1.4.3 Construction stage: Spoiled soils along the 110kV UGC

Bitumen bound surface dress, base layer aggregates, subsoil and rock will be excavated from the 110kV UGC trenches and joint bay locations.

The excavated material from the 110kV UGC trenches in the public road will be all be removed to licensed waste facilities as follows:

- Of the c.2,740 m^3 of bitumen bound surface dressing, c.2650m^3 will be removed to a licensed waste facility such as Kellys of Fantan, or other appropriately licensed facility. The remaining c.90m^3 will be treated as *potentially* contaminated material, where this material is excavated within 15m of invasive species infestations (*see point 3 below*).
- Of the c.1,830 m^3 of base layer aggregate, c.16,450m^3 of subsoil, and c.2360m^3 of rock, of these totals c.1770m^3, c.15900m^3 and c.2300m^3 respectively will be disposed of as spoil and will be removed to a licensed waste facility such as Kellys of Fantan, or other appropriately licensed facility. The remaining c.60m^3, c.550m^3 and c.60m^3 respectively will be treated as *potentially* contaminated material, where this material is excavated within 15m of invasive species infestations (*see point 3 below*).
- 760m^3 of excavated material, will comprise c.90m^3 of bitumen bound surface dressing, c.60m^3 of base layer aggregate, c.550m^3 of subsoil and c.60m^3 of rock, being the material excavated within 15m of invasive species infestations along the route of the 110kV UGC. This material will be classified as potentially contaminated and will be removed to Enva or other appropriately licensed facility. The locations of these infestations were found during surveys and are identified on mapping within the Invasive Species Management Plan, part of the UWF Grid Connection Environmental Management Plan (Volume D).

The management of spoil will be carried out in accordance with the Waste Management Plan which forms part of the UWF Grid Connection Environmental Management Plan (see Volume D).

5.4.1.4.4 Construction stage: Imported Rock

Up to 16,220m^3 of graded crushed stone will be imported onto the UWF Grid Connection work areas from the local Rear Cross Quarry in Shanballyedmond.

5.4.1.4.5 Operational Stage - Soil

No excavations of soils will be required during the routine operation of the UWF Grid Connection.

Planned maintenance or unplanned repairs, if any occur, on the 110kV UGC, is likely to involve the re-opening of the underground chambers, at Joint Bays. This work which will result in very small volumes of surface dressing, crushed stone and sand being temporarily removed from the area directly over the joint bay covers, along with sand removed from within the chamber, stored adjacent to the Joint Bay, and re-used to reinstate the chamber and top of the Joint Bay following the completion of the repairs. The finished layer, if along the public road, will be surface dressed. No soils are expected to be required during the operational stage.

5.4.2 Emissions

The main potential for emissions arises during the Construction Stage.

5.4.2.1 Dust

Dust may arise during the construction stage, due to the transportation of aggregate, movement of delivery vehicles; the movement of excavated material, and from stored excavated materials, particularly during dry and windy weather.

During operation, the presence of excavations on-site, and therefore dust emissions, will be negligible – excavations, will generally only occur at Joint Bays during planned maintenance/unplanned repairs, which are expected to occur only very infrequently (if at all) during operation, and will involve the excavation of surface dressing, crushed stone and sand rather than soils.

5.4.2.2 Vehicle Exhausts

During the construction stage, all of the machinery used will be run on hydrocarbons and will emit nitrogen dioxide and other greenhouse gas emissions.

During the operational stage, the presence of vehicles on site, and therefore nitrogen dioxide and other greenhouse gas emissions, will be negligible with a van or four wheel drive vehicle being used c.13 days per year, split roughly half and half between the Mountphilips Substation and the 110kV UGC. Vehicles emissions from any planned maintenance or unplanned repairs along the 110kV UGC will be negligible due to the small number of vehicles used over a very short duration, and the infrequency of these works, if they occur at all.

5.4.2.3 Noise

During the construction stage, heavy machinery and vehicles which will be used at works areas will emit noise during their operation, noise will also be emitted from certain construction activities such as excavations or by mobile generators which may be used at work areas.

During the operational stage, the presence of vehicles on site, and therefore noise emissions, will be negligible with a van or four wheel drive vehicle being used c.13 days per year, split roughly half and half between the Mountphilips Substation and the 110kV UGC. Mountphilips Substation will emit noise however this is not likely to be audible above the existing background noise levels at nearest residence, which is 385m distant. Noise emissions from any planned maintenance or unplanned repairs along the 110kV UGC will be negligible due to the small number of vehicles used over a very short duration, and the infrequency of these works, if they occur at all.

5.4.2.4 Vibration

Construction works, including excavations and the use of heavy machinery will cause negligible levels of ground vibration in the immediate vicinity of groundworks. **No blasting or piling** will occur at the UWF Grid Connection construction works areas.

No vibration emissions are expected during the operation of the UWF Grid Connection.

5.4.2.5 Light

Lighting will be used at the Temporary Compound at the Mountphilips Substation site during construction.

Lighting will be used at the Mountphilips Substation Compound during its operation to illuminate the Sub-station Compound, the Control Building and access points.

This lighting will use a cowled design along with motion-sensor and timer controlled lights which will not remain turned-on overnight. Outside the Mountphilips Substation site, the 110kV UGC does not require any lighting.

5.4.2.6 Electromagnetic Radiation

Electric and magnetic fields are present anywhere electricity is generated, distributed or used and therefore these electromagnetic fields (EMF) are a common occurrence in everyday life. The operational Mountphilips Substation and the underground 110kV cables will each be a source of very low frequency (50Hz) electro-magnetic fields. No electromagnetic fields will occur during the construction stage.

5.4.3 Waste

The greatest potential for waste occurs during the construction stage of the project.

5.4.3.1 Waste Water

During the construction stage, self-contained toilets, with integrated waste water storage tanks, will be provided for construction workers, at the Temporary Compound at the Mountphilips Substation site. Single self-contained, portable solar-powered toilets will also be provided at each active works area along the 110kV UGC. The waste water storage tanks associated with the above toilet facilities will be emptied on a regular basis, by a licence waste contractor, such as Enva, or other appropriate licenced operator for disposal at Enva's licenced waste water treatment plant in Co. Cork.

During the operational stage, toilet facilities will be installed in the Mountphilips Substation Control Building. The waste water storage tanks associated with the toilet facility at Mountphilips will be emptied on a regular basis to a licensed waste facility.

5.4.3.2 General Waste

During the construction stage, materials such as pallets, packaging, and excess construction and building materials will be generated in small quantities at construction works areas. All individual waste streams will be identified at source, separated into recyclable and landfill waste and stored in a designated area at the Temporary Compound. This waste will be removed regularly, by a licence waste contractor, such as Kieran Kelly Haulage in Co. Clare, or other appropriate licenced operator for disposal at a licenced waste facility.

During operation, general waste will arise in small quantities during maintenance activities at the operational Mountphilips Substation, including empty containers, packaging, materials and rags etc. This waste will be stored in a suitable container in a designated area with the secure Substation Compound.

5.4.3.3 Chemical waste

During construction, very small quantities of chemical waste will be generated, this waste is limited to solid waste oil, such as oily rags. All chemical wastes will be stored in secure, bunded and covered storage containers, in a designated secure part of the Temporary Compound at the Mountphilips Substation site. This waste will be removed regularly, by a licence waste contractor, such as Enva, or other appropriate licenced operator for disposal at Enva's licenced waste water treatment plant in Co.Clare.

During operation, small volumes of chemical wastes, including oil and grease, may arise during the operational stage. These wastes will be taken off-site by the maintenance personnel and disposed of in an appropriately licensed facility.

5.4.3.4 Arisings / Spoiled Soils

During the construction stage, bitumen bound surface dressing and base layer aggregates will be excavated from the 110kV UGC trenches and joint bay locations. In addition subsoil and rock will be excavated. All of this material will be removed to appropriately licensed waste facilities, as follows:

- Of the c.2,740 m^3 of bitumen bound surface dressing, c.2650m^3 will be removed to a licensed waste facility such as Kellys of Fantan, or other appropriately licensed facility (such as Kieran Kelly Haulage, for example). The remaining c.90m^3 relates to *potentially* contaminated material, where this material is excavated within 15m of invasive species infestations (*see point 3 below*).

- Of the c.1,830 m^3 of base layer aggregate, c.16,450m^3 of subsoil, and c.2360m^3 of rock, of these totals c.1770m^3, c.15900m^3 and c.2300m^3 respectively will be disposed of as spoil and will be removed to a licensed waste facility such as Kellys of Fantan, or other appropriately licensed facility (such as Kieran Kelly Haulage or Fogarty Concrete for example). The remaining c.60m^3, c.550m^3 and c.60m^3 respectively relates to *potentially* contaminated material, where this material is excavated within 15m of invasive species infestations (*see point 3 below*).

- 760m^3 of excavated material, will comprise c.90m^3 of bitumen bound surface dressing, c.60m^3 of base layer aggregate, c.550m^3 of subsoil and c.60m^3 of rock, being the material excavated within 15m of invasive species infestations along the route of the 110kV UGC. This material will be classified as potentially contaminated and will be removed to Enva, Co. Laois or other appropriately licensed facility. The locations of these infestations were found during surveys and are identified on mapping within the Invasive Species Management Plan, part of the UWF Grid Connection Environmental Management Plan (Volume D).

Small volumes of stone and aggregate/subsoils will also be excavated at any culvert replacement locations along the 110kV UGC route (up to 13. No. in total).

The management of spoil will be carried out in accordance with the Waste Management Plan which forms part of the UWF Grid Connection Environmental Management Plan (see Volume D).

During the operational stage, no arisings are likely to occur during the operation of the Mountphilips Substation site or during annual inspection and maintenance of the 110kV UGC. Very small volumes of bitumen bound surface dressing would occur as a result of opening of joint bay chambers during any planned maintenance or unplanned repairs at Joint Bay locations along the 110kV UGC. This waste will be removed to an appropriately licensed waste facility.

5.4.3.5 Waste Management Plan

Any wastes which result from the construction of the UWF Grid Connection will be managed under the Waste Management Plan. The Plan includes a hierarchy of controls in relation to waste; Prevent, Reduce, Reuse, Recover and Responsibility and the controls and procedures which will be undertaken as part of the management of waste are specified. A strict chain of custody system will be set up as part of the Waste Management Plan to enable all wastes to be controlled in the appropriate manner.

The construction stage **Waste Management Plan** is included in Volume D: UWF Grid Connection Environmental Management Plan**.**

During the operation of UWF Grid Connection, wastes will be managed by ESB Networks under their waste management system.

5.5 Vulnerability of the Project to Major Accidents and Natural Disasters

Major accidents or natural disasters which have the potential to affect the UWF Grid Connection are described hereunder. The vulnerability (exposure and resilience) of the UWF Grid Connection to major accidents and disasters and the risk of these accidents or disasters is classified according to the *Guide to Risk Assessment in Major Emergency Management* (DoEHLG, 2010), see Appendix 5.7: A Guide to Risk Assessment in Major Emergency Management Jan 2010.

5.5.1 Vulnerability to Major Accidents

It is apparent from the EIA Directive that 'major accident' mainly applies to notified Seveso establishments which operate under the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015, where Dangerous Substances are identified in Schedule 1.

The UWF Grid Connection **is not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during the construction and operation of the UWF Grid Connection, and very small volumes of grease and sulphur hexafluoride (SF6) gas used at the Mountphilips Substation during its operation. Furthermore there are no Seveso sites in proximity to the UWF Grid Connection site, the closest being Grassland Agro in Limerick.

5.5.2 Vulnerability to Natural Disasters

Natural disasters which could *potentially* affect the UWF Grid Connection include flooding and land slippage. The likelihood of these natural disasters occurring is discussed below, with likelihood of the natural disaster occurring rated according to the DoEHLG 2010 Guidelines. The UWF Grid Connection is not considered to be vulnerable to either high winds or extremes of weather as a result of climate change.

5.5.2.1 Flooding

A flood risk assessment study was conducted by David Broderick of Hydro Environmental Services to identify potential flood risks associated with the proposed UWF Grid Connection (see Appendix 11.3: Flood Risk Assessment). It was concluded that there will be no increased local flood risk as a result of the proposed development, mainly due to the underground nature of the 110kV UGC and the minimal footprint of the over ground permanent infrastructure at Mountphilips Substation which is also located outside of mapped flooding areas with a Low Risk of flooding.

In May 2018, the Minister of State for the Office of Public Works & Flood Relief, published the Flood Risk Management Plans. The Minister also launched a new website, www.floodinfo.ie. This map and plan viewer website is another important resource, to support planning and emergency response planning to plan and respond to flood risk. Interaction with mapped fluvial (river) or pluvial (rainfall) flooding zones as per the www.floodinfo.ie website, shows that with the exception of a tributary stream of the Newport River near Coole Crossroads which has mapped fluvial flooding, the UWF Grid Connection is not located within any mapped fluvial or pluvial flooding zone. It is therefore considered that the location of the UWF Grid Connection is at low risk to flooding.

Due to the distributed nature of the works over a large geographical area, the minimal footprint of the over ground permanent infrastructure at Mountphilips Substation site, the location of Mountphilips Substation side outside of mapped flooding areas, the fact that all permanent hardstanding will have runoff control measures and that all new permanent culverts will be sized for peak flood flows (Project Design Measure),

the magnitude of impact is considered to be Negligible, and the likelihood of a flooding disaster occurring is **Extremely Unlikely**.

5.5.2.2 Land-slippage

Given the stable nature of soils at Mountphilips Substation, being poorly draining mineral soil over sandstone tills with no peat present, it is considered that there is a very low risk of land slippage at the Mountphilips Substation site, and the likelihood of a land slippage event is **Extremely Unlikely**.

The entirety of the route of the 110kV UGC, outside the Mountphilips Substation site, is located within road pavements/built surfaces, which are generally underlain by sandstone tills. Peat is mapped under some short sections of the public road in the central area of the 110kV UGC route, however given the location of the 110kV UGC route under the carriageway of a regional public road and the use of geotextile material to support the trench in this central area of the 110kV UGC, it is considered that there is a very low risk of land slippage, and the likelihood of a land slippage event is **Extremely Unlikely**.

5.5.2.3 Vulnerability to Climate Change

High rainfall events and subsequent flooding are now considered to be a consequence of climate change. Flooding is discussed in the previous section and an unrelated flooding disaster is considered Unlikely at this site, and the project is not considered to be vulnerable to flooding events.

Extreme weather such as that experienced in Ireland in recent years, both high temperatures and high winds, will not affect the 110kV UGC which will be underground. The new Mountphilips Substation will not be vulnerable to these extremes because the electrical plant is designed to withstand temperature variability and exposure in the open countryside. Therefore the likelihood of UWF Grid Connection being affect by Climate related weather extremes is considered to be **Extremely Unlikely**.

5.5.2.4 Consequences of Natural Disasters Occurring

The consequence of the impact if the event occurs is described here.

Due to the low number of personnel working on-site at any one location, the consequence of a flooding or land slippage disaster, if they did occur, is considered to be **Limited**.

Due to the relatively low number of people living or working locally, the consequence of a flooding or land slippage disaster, if they did occur, is considered to be **Limited.**

The consequences to water quality due to land slippage or flooding could be **Serious** due to the widespread effects and extended duration of sedimentation effects in downstream watercourses.

5.5.2.5 Overall Risk

When the likelihood and the consequence of a potential flooding or land slippage disaster occurring is applied to the risk matrix from the DoEHLG 2010 guidelines, a broad indication of the critical nature of each risk can be determined.

In relation to on-site personnel and other people in the locality, a flooding or land slippage event would be classed a 'normal emergency' - based on a likelihood rating of Extremely Unlikely and a consequence rating of **Limited**.

According to the DoEHLG 2010 guidelines, in relation to downstream water quality, due to the higher level of effect (Serious) on water quality a flooding or land slippage event could be at the **lower extreme of 'major emergency'**.

5.5.2.6 Mitigation Measures

In relation to flooding risk, the mitigation measures, listed below, will be implemented which relate to scheduling works when flows are likely to be lower and ground conditions are typically dryer, this will reduce any risk of flooding and any vulnerability to unrelated flood events:

- Project Design Measure 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.
- Project Design Measure 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;

In relation to land-slippage risk, the sections of the 110kV UGC trench within the R503, in the central part of the 110kV UGC where the adjacent lands comprise predominantly peaty soils, will be lined with a geotextile membrane which will provide support to the cables and additional support and stability to the structure of the road. This will further reduce any risk of land slippage.

In relation to unrelated disasters in the locality: Should a disaster occur, unrelated to the project but in the locality – the use of weather forecasting, and the daily monitoring of the works by the Environmental Clerk of Works and site Ecologist, in addition to the measures detailed herein, will ensure that the project will not make the consequences of the event worse. In addition, it is considered that the development of UWF Grid Connection will not increase the likelihood of such an event occurring.

5.6 Description of Other Projects included in Cumulative Evaluations

A cumulative evaluation of the effects of the subject development together with other projects is presented in all of the Environmental Factor topic chapters.

Projects included in the cumulative evaluations in this EIA Report comprise related (off-site) projects related to the UWF Grid Connection (i.e. other elements of the Whole UWF Project), and also other unrelated projects which are not connected with the UWF Grid Connection. These projects are described in this Section 5.6. Descriptions of relevant activities in the surrounding area are also included.

5.6.1 Description of Related Projects - the Other Elements of the Whole UWF Project

UWF Grid Connection is part of a whole project – the Whole Upperchurch Windfarm Project (Whole UWF Project). The characteristics of the UWF Grid Connection are described in Sections 5.1 to 5.5 of this Chapter 5. To facilitate the evaluation of cumulative impact of the other parts of the Whole UWF Project with UWF Grid Connection, an overview description is provided, in this Section 5.6.1, of all the Other Elements of the Whole UWF Project.

Table 5-8: Element 1 to 5 of the Whole UWF Project

	Element of the whole UWF project	Composition of each Element	Location for description of each element
1	**The Subject Development** UWF Grid Connection	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Ancillary Works at Mountphilips Substation site	Sections 5.1 to Section 5.5 herein
2	UWF Related Works	Internal Windfarm Cabling Realigned Windfarm Roads Haul Route Works Telecom Relay Pole RW Ancillary Works	Appendix 5.3
3	UWF Replacement Forestry	Replacement Forestry at Foilnaman	Appendix 5.4
4	Upperchurch Windfarm	Consented UWF Turbines Consented UWF Substation Consented UWF Roads UWF Ancillary Works	Appendix 5.5
5	UWF Other Activities	Haul Route Activities Upperchurch Hen Harrier Scheme Monitoring Activities Overhead Line Activities	Appendix 5.6

An **Overview description of each elements 2, 3, 4, and 5** of each other element in this Section hereunder. **A more detailed description of each element 2, 3, 4, and 5** (presented in a format similar to this chapter and with smaller scale reference mapping and figures) is presented in Appendices 5.3 to Appendix 5.6 in Volume C4: EIAR Appendices**.**

An EIA has been carried out for Upperchurch Windfarm, and EIS accompanied the 2013 planning application. EIA Reports have also been prepared to accompany planning applications to the relevant Competent Authorities, for UWF Replacement Forestry and UWF Related Works (Note: the EIA Report for UWF Related Works was revised at appeal stage to an Bord Pleanála).. The **full EIA and EIS, EIA Report and Revised EIA Report** (as appropriate) for **Elements 2, 4, and 3 (respectively)** are included in Volume F: Reference Documents for Other Elements of the Whole UWF Project.

Relevant Volume C3 EIAR Figures:

Figure CE 1.1: Location of UWF Grid Connection and the Other Elements of the Whole UWF Project on OSI Discovery Mapping.

5.6.1.1 Cumulative Locational Context of all the Elements

The majority of the Whole UWF Project is located in County Tipperary with some minor activities along the Upperchurch Windfarm turbine component haul route and on the Killonan to Nenagh 110kV overhead line, in County Limerick (these activities are part of Element 5: UWF Other Activities).

The UWF Grid Connection is adjacent to and overlaps with Other Elements of the Whole UWF Project and in particular;

- It overlaps with Upperchurch Windfarm at the Consented UWF Substation.
- It is adjacent to the UWF Related Works and the Upperchurch Windfarm in Knocknabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands
- At Mountphilips Substation**,** some fiber-wrapping and re-sagging activities (UWF Other Activities) will be carried out from the new End Mast

Relevant Volume C3 EIAR Figures:

Figure CE 1.2: UWF Grid Connection and the Other Elements of the Whole UWF Project in the vicinity of Upperchurch Windfarm.

Figure CE 1.3: UWF Grid Connection and the Other Elements of the Whole UWF Project in Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands (close-up aerial mapping).

5.6.1.2 Overview Description of Element 2: UWF Related Works

5.6.1.2.1 Introduction to UWF Related Works Reports

A planning application was made by Ecopower Developments Limited to Tipperary County Council for works relating to the construction and operation of the already consented Upperchurch Windfarm – to be called UWF Related Works (Planning Ref. 18/600913). The planning application was accompanied by an EIA Report. The planning application was submitted on 17/07/2018, Further Information was requested on 10/09/2018. Tipperary County Council Refused Permission on 10th January, 2019. On 6th February, 2019, Ecopower Developments lodged a 1st Party Appeal with An Bord Pleanála on the UWF Related Works Refusal by Tipperary County Council. ABP Ref. 303634-19.

The UWF Related Works project was not changed in terms of location and characteristics for the Appeal to An Bord Pleanála. However the original May 2018 EIA Report was revised for the appeal to An Bord Pleanála in February 2019 - and called Revised EIA Report (2019). The revisions to the May 2018 EIAR were necessary in order to take account of the Reason for Refusal by Tipperary County Council of UWF Related Works; the 2 No. Tipperary County Council Planner's Reports (dated 06/09/2018 and 10/01/2019); and the Submission to Tipperary County Council on UWF Related Works from NPWS dated 13.12.18. The Revised EIAR also took account of the Refusal by An Bord Pleanála to Grant planning for UWF Grid Connection (ABP-301959-18: Board Order dated 17/12/2018); and the ABP Inspector's Report on UWF Grid Connection (dated 27th November 2018) and evaluated the cumulative effects of a preliminary route for the UWF Grid Connection 110kV UGC along the R503 Regional Road, through Newport town and on the local road network to the Mountphilips Substation site. It is noted for completeness that the UWF Grid Connection layout presented therein and evaluated in respect of cumulative effects with UWF Related Works differed slightly from the current 2019 application for UWF Grid Connection, (i.e. the 110kV UGC route now by-passes Newport town).

The full **Revised EIA Report (2019) including mapping and figures for UWF Related Works** is included in Volume F1: Reference Documents for Other Elements of the Whole UWF Project.

An extract from Volume F, comprising a **detailed description** of the UWF Related Works (presented in a format similar to 5.2 to 5.5 above) along with a **copy of the accompanying figures** is included in Appendix 5.3: Description of Development (UWF Related Works).

5.6.1.2.2 Location and Characteristics of UWF Related Works

The UWF Related works comprises of the following:

Internal Windfarm Cabling of c. 17.9km in length, to connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables within ducts in trenches 1.25m deep and 0.6 wide. The majority (11.1km) of the Internal Windfarm Cabling will be installed under Consented Upperchurch Roads or Realigned Windfarm Roads. The remainder of the Internal Windfarm Cabling will be installed in agricultural lands (4.6km), forestry lands (2.1km and forestry felling of 0.1ha), and crossing under 9 No. public roads (40 meters). The cabling will traverse the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin.

The Internal Windfarm Cabling consists of electrical cables and communication cables and the copper conductor cables which are installed inside High Density Polyethylene (HDPE) ducting in underground trenches. The trench will be excavated, ducting and warning tapes installed and trench backfilled and reinstated. When the ducting installation is finished and the trench reinstated, the electrical, communication and copper conductor cables will then be pulled through the ducting. The only surface expression of the Internal Windfarm

Cabling will be the over-ground identification marker posts and marker plates which will be installed at regular intervals above the cables trench

Realigned Windfarm Roads to realign the Consented UWF Roads at three locations; (1) The consented windfarm road to Turbine No.5 in Shevry is 560m in length, and will replace this road in its entirety with a new road 230m in length through forestry. This will require forestry felling of 0.2ha; (2) The consented windfarm road between Turbine No.19, Turbine No. 20 and Turbine No. 21, is 840m in length. It will replace 370m of this road with a new road also 370m in length. 220m of this road will be located on grassland field, with the remaining 150m in length located on existing farm road. The existing farm road section will be upgraded during construction works; (3) A short length (30m) of new access road is between the consented windfarm roads in Knockmaroe to the new Telecom Relay Pole.

Haul Route Works are along public road verges, roadside boundaries and grassland fields in order to widen parts of the L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 by between 0.5m and 1.5m and to widen an entrance off the R503 by 30m. These works will facilitate the delivery of turbine components to the Upperchurch Windfarm site and will take place in the following townlands: Shevry, Knockcurraghbola Commons, Knocknabansha, Knockmaroe and Grousehall. Works include the removal of soils and laying of crushed stone and hard-core in roadside verges for 1710m in total; temporary removal and reinstatement of 1035m of hedgerow and earthen banks which form roadside boundaries; permanent removal of 25m of roadside boundary and the construction of 290m temporary access roads on private lands.

The **Telecom Relay Pole** will relay communication signals around the Consented UWF Turbines in order to avoid interference from the operating Upperchurch Windfarm. The Telecom Relay Pole will comprise a wooden pole, up to 18m in height, with relay equipment attached to the top of the pole. A small compound, 5m X 5m in size, will enclose the relay pole, along with a ground based outdoor cabinet 2m high, 1.2m long and 1m wide and ancillary equipment. The compound will be securely fenced with 2.4m high palisade fencing; a native hedgerow will be planted around the compound on the berm created from the excavations. A communications and low voltage (LV) electricity supply will be cabled to the compound, from the existing supply at the Foilnaman mast, by 300m in length of underground cabling.

RW Ancillary Works will facilitate the construction of the UWF Related Works and will include a change of use for an existing agricultural entrance to agricultural and forestry entrance in permanent use, and 14 No. temporary site entrances; 5300m of temporary access roads; temporary and permanent watercourse crossings, involving 24 No. small field drains and 8 no. streams; drainage systems around permanent features and temporary drainage around works areas; 0.3 hectares of forestry to be felled; temporary and permanent hedgerow/tree removal; temporary and permanent fencing, temporary goal posts and bat crossing structures; relocation of 5 No. existing telephone poles; 11,830m^3 of material will be excavated and temporarily stored for subsequent reinstatement or permanently placed in berms; reinstatement of roadside boundaries and public road surfaces.

Environmental Protection Measures: A suite of Project Design measures, similar to UWF Grid Connection Project Design Measures, will be implemented during the construction of UWF Related Works. These measures along with Management Plans for Traffic, Surface Water, Waste and Invasive Species, will be implemented through a UWF Related Works Environmental Management Plan, the implementation of which will be monitored by a full time Environmental Clerk of Works. A description of the Environmental Protection Measures for UWF Related Works is provided in Appendix 5.3: Description of Development (UWF Related Works. The UWF Related Works Environmental Management Plan is included in Volume F4: Reference Documents for Other Elements of the Whole UWF Project.

5.6.1.2.3 UWF Related Works: Construction, Operation & Decommissioning

UWF Related Works Construction Phase: All elements of the Whole UWF Project will be constructed at the same time and is expected to commence in 2020/2021 and will take approx. 12 months. 5 of the c.100 persons working directly on the Upperchurch Windfarm site will work on UWF Related Works. A specialist communication engineering crew, made up of c. 2 personnel, will be involved in the erection and set up of the Telecom Relay Pole. The UWF Related Works, 23 No. loads of concrete and 292 No. loads of aggregate will be transported to the site by HGV, from local suppliers. A further 2 No. loads of road surfacing material and 43 No. loads of specific building materials will also be imported to the site, from various suppliers in the Region.

UWF Related Works Operational Phase: Upperchurch Windfarm has been granted permission to operate for 25 years from the date of commissioning. UWF Related Works will operate for the same period as the windfarm. The personnel employed in operation and maintenance of Upperchurch Windfarm will also maintain the UWF Related Works.

UWF Related Works Decommissioning: The UWF Related Works will cease to function following the decommissioning of the Upperchurch Windfarm. The Internal Windfarm Cables will be pulled from the ducts and will be re-used off-site or recycled in a licensed recycling facility. Realigned Windfarm Roads will be left in situ, for use by the landowner. Haul Route Works will be left in situ. The Telecom Relay Pole and compound will be removed and the footprint of the compound will be reinstated with the soils from the surrounding berms.

UWF Related Works use of Natural Resources: 20.9 hectares of land within the full UWF Related Works construction site which is reduced to just 25m^2 around the Telecom Relay Pole compound, during the operational phase; 4750m^3 of topsoil, 6670m^3 of subsoil and 360m^3 of rock will arise from excavation works; small amounts of potable and non-potable water will be imported onto the site as required; 170m of hedgerow and 4 No. trees will be removed and the equivalent amount replanted following construction.

UWF Related Works Emissions: Insignificant dust, construction machinery exhaust, noise, vibration and light will be emitted during the **Construction Stage**. During the **Operational Stage** there will be negligible dust, vehicle exhaust, noise, vibration and light emitted. The operational electrical plant will be a source of electromagnetic fields but these will not be at levels to cause significant effects.

UWF Related Works Waste: UWF Related Works personnel will use the welfare facilities and waste facilities provided at the Upperchurch Windfarm Site Compound No. 1. At these facilities, waste water will be contained in self-contained units and emptied by a licenced facility. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at Site Compound No.1 and collected by an appropriately licensed waste contractor. There will be minimal general and chemical waste during the **Operational Stage**. This waste will be stored in a designated and secure area at the windfarm site offices and collected by an appropriately licenced operator. Welfare facilities for the Upperchurch Windfarm operation and maintenance personnel will be provided at the windfarm site offices. Any wastes which result from the construction, operation and decommissioning of UWF Related Works will be managed under the Waste Management Plan for the operating Upperchurch Windfarm.

5.6.1.3 Description of Element 3: UWF Replacement Forestry

5.6.1.3.1 Introduction to UWF Replacement Forestry Reports

An **afforestation license** for UWF Replacement Forestry **was granted by the Minister for Agriculture, Food and the Marine on 07/11/2018**. Forest Owner Number FO138819C. Contract Number CN81893. The application for the licence was accompanied by an EIA Report.

The **full EIA Report including mapping and figures for UWF Replacement Forestry** is included with the planning application in Volume F5: Reference Documents for Other Elements of the Whole UWF Project.

An extract from Volume F of the **detailed description** of the UWF Replacement Forestry (presented in a format similar to 5.2 to 5.5 above) along with **a copy of the accompanying figures** is included in Appendix 5.4: Description of Development (UWF Replacement Forestry).

5.6.1.3.2 Location and Characteristics of UWF Replacement Forestry

UWF Replacement Forestry relates to the planting with forestry, of 6ha of agricultural lands the purpose of which is to fulfil the replanting obligation which will arise from the felling of forestry for Other Elements of the Whole UWF Project, namely Upperchurch Windfarm and UWF Related Works. No forestry felling is required for UWF Grid Connection.

Located at Foilnaman townland, near Upperchurch, County Tipperary, 6 hectares (6ha) of agricultural grassland at will be planted with native woodland species, set in clusters of well-matched native species. There will be varied spacing created between the clusters according to Forest Service recommendations. A mixture of tall trees and understory shrubs will be planted, and the design includes wide ride-lines between deeper areas of core woodland. The ride-lines will create open spaces with tree-lined boundaries, which is much favoured by birds of prey during the day (e.g. hen harrier) and bats at night as hunting ground. A mixture of land cover – tall grasses, short grasses and scrub will be maintained under the planting and in the ride lines. Tree guards will be used to protect the saplings and young trees from rabbit damage. A livestock-proof fence will be erected around the perimeter of the planting.

The lands to be afforested are currently in two agricultural landholdings. A small watercourse, with existing culvert crossing, runs through the centre. The existing riparian habitat along this watercourse will be enhanced through planting with hazel, alder and willow species and the entire afforestation land will be protected from livestock by the perimeter fencing.

There is a change of use required for an existing agricultural entrance to agricultural and forestry entrance which will remain in permanent use. This change of use is part of UWF Related Works – RW Ancillary Works.

The UWF Replacement Forestry will be designed and planted in accordance with the Forest Service (2006) Information Note No. 5: Establishment, Design and Stocking Densities of New Native Woodland and Felling and Reforestation Policy published by the Forest Service (May 2017).

Environmental Protection Measures: A number of Project Design measures and Best Practice measures will be implemented during the planting stage of UWF Replacement Forestry. All works and activities associated with UWF Replacement Forestry will be carried out in accordance with its Invasive Species Management Plan. The implementation of the Project Design and Best Practice measures and the adherence to the Invasive Species Management Plan will be monitored and audited by a full time Environmental Clerk of Works. A description of the Environmental Protection Measures for UWF Replacement Forestry is provided in Appendix 5.4: Description of Development (UWF Replacement Forestry). Best Practice measures and the Invasive Species Management Plan are included in Reference Documents for Other Elements of the Whole UWF Project Volume F7: Appendix 5.1 and Appendix 5.2.

5.6.1.3.3 UWF Replanted Forestry: Planting and Growth Stage

Planting Stage: Tree planting will be carried out by 4 No. forestry professionals. Tree saplings, wooden fence posts and fencing wire and gates will be imported to the site by 4WD vehicle.

Growth Stage: Once planted, the trees will go through numerous stages of growth from sapling, through to maturity, old age and eventual decay with natural regeneration occurring through the lifecycle of the native wood. Other than thinning activities and grass/scrub management, natural maturation, old age and regeneration, no other changes to the native woodland are expected. Felling is not planned.

Harvesting: The woodland will be permanent woodland and unlike commercial forestry plantations, the new native woodland will not be harvested or felled.

Use of Natural Resources: 6ha of agricultural land will be planted with mixed species to create a native woodland, comprising tall trees and understory shrubs, along with wide ride-lines, and a mix of tall grasses, short grasses and scrub land cover maintained during the growth stage. This will enhance biodiversity in the area. New trees and shrubs will be set back from the watercourse which runs through the UWF Replacement Forestry site. The existing riparian habitat will be enhanced through the planting with hazel, alder and willow species and the lands will be protected from livestock by the perimeter fence. Planting will be carried out by hand using spades. Small localised patches of disturbed soil will occur at the tree sapling locations.

Emissions – emission levels associated with either Planting or Growth Stage activities will be Negligible, mainly due to the very short duration of work, the planting by hand.

Waste - Planting and Growth Stage – during the planting stage waste such as packaging will be generated in very small quantities and this waste will be removed at source and disposed of in an appropriate licensed facility. No waste is expected to occur during the Growth stage.

5.6.1.4 Overview description of Element 4: Upperchurch Windfarm

5.6.1.4.1 Introduction to Upperchurch Windfarm Reports

An overview description of already consented Upperchurch Windfarm (UWF) is provided hereunder.

An application for planning permission for Upperchurch Windfarm was made to Tipperary County Council in January 2013. The windfarm was permitted by Tipperary County Council in January 2014 and the permission was upheld by An Bord Pleanála in August 2014. The application was accompanied by an EIA Report (known as EIS at the time) and Natura Impact Statement.

A document, with a detailed description of the Upperchurch Windfarm, has been compiled from the original 2013 Upperchurch Windfarm EIS, from the Reply to Further Information, the additional information submitted during the planning process and mitigation measures and planning conditions attaching to the Grant of Permission, to reflect a description of the development as it is now permitted. This compilation document has been prepared in the same format as the current application Chapter 5, for ease of cross referencing. The compilation document can be found in Appendix 5.5: Compiled Description of Upperchurch Windfarm.

The full planning documents, including the Inspectors Report, EIS, RFI and Environmental Management Plans, for the consented Upperchurch Windfarm can be found in Volume F8 & F9: Reference Documents for Other Elements of the Whole UWF Project**.**

5.6.1.4.2 Location and Characteristics of Upperchurch Windfarm

Upperchurch Windfarm will comprise 22 wind turbines with an overall height up to 126.6 metres, 2 meteorological masts with an overall height of up to 80 metres, turbine foundation and crane hardstanding areas, access roads and an electrical substation. The Upperchurch Windfarm site is located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. This is an area 2km west of Upperchurch village and 18km to the west of Thurles, County Tipperary.

The 22 wind turbines, associated crane hardstandings and ancillary works will be constructed on a series of small hills ranging in elevation from 280m to 401m OD, set out generally over four areas. The substation will be constructed in Knockcurraghbola Commons and the turbines will be connected by underground cables to the substation. There will be two meteorological masts erected, one in Grousehall and a second in Knocknamena townlands. Ancillary Works will include borrow pits in Shevry, Knocknamena, Knockmaroe and Grousehall; 1 No. site entrance from the R503 Regional Road at Graniera and; 10 No. site entrances from local public roads, through and around the site, which will provide access to the windfarm.

Upperchurch Windfarm (UWF) is comprised of the following parts:

Consented UWF Turbines - 22 No. wind turbines of the three-bladed, tubular tower model, light grey in colour and an overall height to blade tip up to 126.6m. The turbines will be constructed on concrete bases with an adjacent hard-core hardstand area. There is no requirement for fencing of turbine areas. The turbines will be connected by underground cables to the Consented UWF Substation. The underground cabling forms part of the UWF Related Works application (Internal Windfarm Cabling).

Consented UWF Substation - 110kV substation compound which includes a control building, main transformer and other electrical equipment enclosed in a compound by a palisade fence. The substation will measure 64m x 41m.

Consented UWF Roads - 11.6km of windfarm access roads will comprise 8km of newly built 5m wide roads and 3.6km of existing farm roads which will require upgrading and widening (by average of 2m).

Consented Upperchurch Windfarm Ancillary Works – The main items of ancillary works will include, 2 No. meteorological masts up to 80m in height; 11 No. site entrances; 1 No. stream crossing; site drainage system; 2 No. construction site compounds (Site Compound No.1 at Graniera, and Site Compound No.2 at existing building in Knockcurraghbola Commons); 6 No. borrow pits from which most of the aggregate required will be won; forestry felling, hedgerow removal and reinstatement; excavation, storage and reinstatement of soils.

5.6.1.4.3 Upperchurch Windfarm: Construction, Operation & Decommissioning

Upperchurch Windfarm Construction Phase: Construction of Upperchurch Windfarm is expected to commence in 2020/2021 and will take approx. 12 months. Approximately 277 persons will be engaged in the civil, electrical, project management, legal and financial services, material supply and component deliveries for the windfarm. Approximately 950 No. loads of concrete; 15 No. loads of reinforcing steel and 5 No. loads of general building materials and 212 No. loads of electrical plant and equipment (abnormal size loads) will be imported to the site by HGV. The abnormal turbine loads will be transported from Foynes Port.

Upperchurch Windfarm Operational Phase: Upperchurch Windfarm has been granted permission to operate for 25 years from the date of commissioning of the wind turbines, whereupon there will then be an option to apply for continuance of use or decommission the plant and restore the site. There will be 8 permanent jobs created in operation and maintenance activities, legal, electricity sales and asset management during the operational phase.

Upperchurch Windfarm Decommissioning: this will involve the removal of all the turbines, removal of the above ground turbine foundation elements and covering the hardstanding areas with topsoil and reseeding. Any roads or hardstands that are not required by the landowner for farm use, can be covered with topsoil and reseeded also. Cabling will be isolated and left in-situ underground. The substation compound will include an ESB Networks owned control room and a windfarm owned control room. The windfarm owned electrical equipment would be decommissioned and sold as second hand equipment. The ESB substation could remain as part of the national electricity network, after the wind farm site is decommissioned.

Upperchurch Windfarm Use of Natural Resources: 56.3 hectares of land within the construction works site will reduced to 6.4 ha during the operational phase; Approx. 108,000m^3 of excavated soils; 43,000m^3 of aggregate mostly won on-site and otherwise imported from local quarry at Shanballyedmond, Rear Cross; small amounts of potable and non-potable water, sourced at an existing well at the windfarm site offices in Site Compound No. 2; felling of 4.4 hectares of conifers; 960m of hedgerow removed (with an equivalent length of new hedgerow planted).

Upperchurch Windfarm Emissions: Dust, construction machinery exhaust, noise, vibration and light will be emitted during the construction stage. There is no house within 200m of the construction works. During the **Operational Stage** there will be negligible dust, vehicle exhaust, vibration and light emitted. The turbines will emit noise during operation. Permitted noise emissions are prescribed by planning condition. The operational electrical plant will be a source of very low frequency (50Hz) electromagnetic fields but these will not be at levels to cause significant effects at the turbine locations, and no effects will occur at local residences.

Upperchurch Windfarm Waste: During construction, waste water from welfare facilities will be contained in self-contained units and emptied by a licenced operator in an appropriately licenced facility or in the case of the Site Offices, will be treated in the existing septic tank. General and chemical waste will also arise from construction activities and processes. During operation, minimal general and chemical waste will arise on site. All waste will be stored in designated and secure areas, for collection by an appropriately licenced operator. Any wastes which result from the construction, operation and decommissioning of the Upperchurch Windfarm will be managed under a site specific Waste Management Plan.

5.6.1.4.4 Upperchurch Windfarm contribution to Climate Action

Renewable Energy Sources - Electricity (RES-E) contribute to the National Target of 40% of RES-E on the National Grid by 2020. This target was set by the European Commission as part of the EU member's efforts to combat the serious threat of climate change. Every unit (kWh) of electricity generated by clean renewable sources replaces a unit of electricity generated by fossil fuel sources and thereby offsets the pollution (expressed in CO_2e) that would be emitted by fossil fuel generation.

Table 5-9: Upperchurch Windfarm contribution to climate action

Value	Unit	Source
220,000,000 kWh	Kilowatt hours of electricity per annum which will be generated by Upperchurch Windfarm	Predicted production from the 22 Wind Turbines at Upperchurch Windfarm
52,381 houses	houses/per annum that will be supplied with electricity from Upperchurch Windfarm	Based on CRU Figures of 4,200 kilowatt hours of average use per annum per household in Ireland (August 2017). *Review of Typical Domestic Consumption Values for Electricity and Gas Customers (CER 17/003)*
40%	% of all Households in County Tipperary and County Limerick combined, that could be supplied with all of their electricity consumption from Upperchurch Windfarm	Households according to Census 2016 (CSO)
CO_2e offsets: Upperchurch Windfarm will generate 220,000,000 kWh every year without emitting greenhouse gases (GHG) or ash pollution and this will avoid an equal amount of electricity being generated from gas, coal or oil, which do emit GHG. The gases in a GHG bundle (carbon dioxide, methane, nitrous oxide and ozone) are represented by the term CO_2e (Carbon Dioxide equivalent) when discussing offsets. The following section sets out the CO_2e that is emitted by cars and dairy cows and compares those emissions to the savings or offsets in CO_2e from Upperchurch Windfarm (CO_2e offsets) production. It also sets out the amount of forestry that would be required (forestry sequestration or CO_2e absorption) for the same CO_2e offsets contribution, as Upperchurch Windfarm.		
106,216 tonnes	(Greenhouse Gases) CO_2e tonnes per annum that would otherwise be emitted if the 220,000,000 kWh to be generated by Upperchurch Windfarm, was instead generated by gas, coal and oil	Based on the energy intensity of the Irish electricity generation mix of 482.8g CO_2e/kWh (Source: Energy-related CO_2 Emissions in Ireland 2005-2016 (SEAI, 2018))
44,629 cars	Number of cars that would emit the equivalent amount of CO_2e (106,216 tonnes) per annum	Based on Irish Motor Industry June 2018 (2.38 tonnes/per annum CO_2e per car) and Cartell.ie March 2018 (average per car in Ireland 21,025 km/per annum)

Value	Unit	Source
2,079,345 cars	Number of cars in Ireland	CSO 2017
2.15%	% of the cars in Ireland that can be offset by Upperchurch Windfarm production	
5 tonnes	tonnes of CO_2e emitted per cow per annum	Average annual production from a cow (6,000 litre milk) on grass based diet in Ireland results in 5 tonnes of CO_2e emissions per annum. Teagasc (Environment Knowledge Transfer Department 2019)
21,243 cows	Number of cows that would emit the equivalent amount of CO_2e (34,037 tonnes) that can be offsets from Upperchurch Windfarm production	
164,245 cows	Dairy cows in Tipperary	Irish Cattle Breeding Federation numbers for 2017 *(https://www.icbf.com/wp/?p=10601)*
13%	% of the Tipperary dairy cow herd that can be offset by Upperchurch Windfarm production	
8,614 hectares	Equivalent hectares of forestry that would be required if the same amount of CO^2 that Upperchurch Windfarm would avoid, was to be absorbed by growing forest (forestry sequestration)	COFORD estimate that Irish forests on average sequester 3.36 tonnes of carbon per hectare per annum. (Carbon Sequestration in Irish Forests (COFORD 2009). 1 tonne of Carbon = 3.67 tonnes of CO^2. Therefore 1 hectare of Irish forest sequesters 12.33 tonnes per annum of CO^2 The COFORD Council is a body appointed by the Minister for Agriculture, Food and the Marine to advise the Minister and his Department on issues related to the development of the forest sector in Ireland.

5.6.1.5 Overview Description of Element 5: UWF Other Activities

5.6.1.5.1 Introduction to UWF Other Activities Reports

Although UWF Other Activities do not require planning permission, they do form part of the Whole UWF Project and therefore are included in the cumulative evaluations.

A summary description of the UWF Other Activities is provided below. A more **detailed description of these activities,** along with **mapping and figures** is included in Appendix 5.6: Description of the UWF Other Activities.

5.6.1.5.2 Location and Activities of UWF Other Activities

The **Haul Route Activities** will facilitate the transportation of turbine components to the Upperchurch Windfarm site and are located at various points on the national and regional road network along the Upperchurch Windfarm turbine component haul route between Foynes Port in County Limerick and junction of the R503 and R497 Regional Roads in Knockmaroe townland, County Limerick. Activities comprise the laying of matting over verges at up to 5 No. locations, removal and replacement of street furniture (mainly signposts) at 13 No. locations and the trimming of up to 960m of roadside hedgerow/trees at up to 15 No. locations.

The **Upperchurch Hen Harrier Scheme** will enhance and protect habitat for hen harrier in the vicinity of Upperchurch Windfarm, in order to fulfil planning condition No.18, attaching to the windfarm. The Upperchurch Hen Harrier Scheme is located in Knockcurraghbola Commons, Coumnageeha, Foilnaman, Knockmaroe and Grousehall townlands on 128ha of agricultural lands between the Slievefelim to Silvermines SPA and the Upperchurch Windfarm. Activities associated with the Scheme includes once off activities such as planting of hedgerows and trees; enhancement of riparian corridors and scrub/wood areas; and the fencing off of watercourses and newly planted trees and shrubs. The Scheme also includes long-term farm management practices such as management of rush coverage, livestock grazing and the control of the use of lime, fertilizers and burning of gorse, amongst others. Nine local landowners are signed-up to the Scheme. Implementation involves a mix of initial once-off activities which will both create new habitat and protect and enhance existing habitat; and on-going farming practices which will result in the long term maintenance of hen harrier habitat.

Monitoring Activities will monitor the Whole UWF Project for compliance with the environmental protection measures and mitigation measures detailed in the Upperchurch Windfarm 2013 EIS and 2013 RFI (including the Construction Environmental Management Plan for Upperchurch Windfarm and the Ecological Management Plan for Upperchurch Windfarm); Planning Conditions attaching to the already consented Upperchurch Windfarm; and measures in the UWF Grid Connection EIA Report (2019), the UWF Related Works Revised EIA Report (2019) and the UWF Replacement Forestry EIA Report (2018), environmental protection measures set out in the Description of UWF Other Activities (see Appendix 5.6), and the Environmental Management Plans for UWF Grid Connection, UWF Related Works and Upperchurch Windfarm. Monitoring will also involve the supervision and recording of key construction activities, and monitoring of progress of land reinstatement. Operational stage monitoring will include monitoring of the success of Upperchurch Hen Harrier Scheme throughout the operational lifetime of Upperchurch Windfarm. Monitoring will also include operational planning conditions and Ecological Management Plan compliance.

Overhead Line Activities include re-sagging activities and potential fibre wrapping activities which will be carried out by ESB Networks. The purpose of the re-sagging activities is to correct the tension of the existing overhead line, following the installation of the UWF Grid Connection End Masts, so that the lines are held within predefined tension parameters. The purpose of fibre wrapping is to provide a communication link to the newly installed Mountphilips Substation. The tension will be corrected on 2 no. Sections - i) between

ESBN Angle Mast Structure No. 79 (c.200m south of Mountphilips substation) to New Mountphilips End Mast No. 1 and ii) between New Mountphilips End Mast No. 2 and ESBN Angle Mast Structure No. 90 (2.3 km north of Mountphilips substation). Wrapping the overhead line with fibre optic cable from Killonan ESBN substation (just east of Limerick City) to Mountphilips substation. The Overhead Line Activities will be carried out according to industry standard method statements, including standard health & safety and environmental management systems.

Environmental Protection Measures: A number of environmental protection measures will be implemented during the carrying out of UWF Other Activities. These environmental protection measures will be incorporated into their respective Environmental Management Plans, as appropriate. For example, measures which are relevant to Monitoring of UWF Grid Connection works will be incorporated into the UWF Grid Connection Environmental Management Plan. A description of the Environmental Protection Measures for UWF Other Activities is provided in Appendix 5.6: Description of UWF Other Activities.

5.6.1.5.3 UWF Other Activities: Construction, Operation & Decommissioning

Timing: The **Haul Route Activities** will occur prior to commencement of turbine component haulage and reinstatement will occur immediately after the passage of all components. The initial once-off activities associated with the **Upperchurch Hen Harrier Scheme** such as permanent planting and fencing of newly planted areas and watercourses will be carried out during the same period as the construction of Upperchurch Windfarm and UWF Related Works. There will be pre-construction **Monitoring Activities** before Upperchurch Windfarm and UWF Related Works commence. **Overhead Line Activities** will take place at the same time as the construction of Mountphilips Substation for UWF Grid Connection.

UWF Other Activities Construction Phase: Approximately 50 persons will be engaged in UWF Other Activities including haul route activities, landowners involved in the hen harrier scheme, environmental experts engaged in the monitoring schemes and ESB Crews involved in overhead line activities. There will be very little materials delivered to the activity sites, these will include deliveries of geotextile matting, trees and shrubs, fencing materials and specialist ESB equipment.

UWF Other Activities Operational/Decommissioning Phase: The same **Haul Route Activities** as for the construction phase, will be required in the occasional event of a large component delivery to Upperchurch Windfarm, if required, during the operational phase, and if required during the decommissioning phase of the windfarm. The farming practices required under the **Upperchurch Hen Harrier Scheme** will continue throughout the lifetime of Upperchurch Windfarm. **Monitoring** of the success of Upperchurch Hen Harrier Scheme will be carried out during the operational lifetime of Upperchurch Windfarm. Monitoring will also include surveys for and compliance auditing of operational planning conditions and the operational stage Ecological Management Plan, and compliance with any measures associated with the decommissioning stage.

Use of Natural Resources: No land use changes required. No water or welfare facilities required. No mechanical excavations required; all planting will be carried out by hand. For haul route activities, up to 960m of roadside boundary hedges/treelines will be trimmed, outside of the general bird breeding season. For the Hen Harrier Scheme, 2.2ha of trees, 1.4km of riparian habitat and 2.8km of new hedgerow will be enhanced or created during initial activities. In total 128 hectares of agricultural lands will be management for the benefit of hen harrier.

There will be negligible **Emissions** from vehicles transporting personnel and any general **Waste** arising on-site will be removed by the crew themselves during the **construction** and **operational phase** of these Other Activities**.**

5.6.2 Secondary Projects

Secondary projects are projects that arise largely because of the existence of the principle project, though they are not usually carried out by the Promoter of the principle project.

The addition of Mountphilips Substation will add a new high voltage electrical substation in the Newport area. This may facilitate new connections to the Mountphilips substation in the future. However, there are no new connections planned or proposed at present.

5.6.3 Description of Other Unrelated Projects and Activities

Unlike related off-site projects or secondary projects (which are integral to the subject project or may arise largely because of it), Other Projects or Activities relates to existing or consented (or proposed) projects and on-going activities in the area, which are not connected to the subject project, and which by addition could create larger more significant effects to the environment.

Other Projects & Activities in the area were scoped for inclusion in this assessment, using geographical and time-frame boundaries and conceptual site model exercises. For a full description of this exercise and the results of the scoping see Appendix 2.1: Scoping of Other Projects or Activities for Cumulative Evaluations.

A summary table of the results of this scoping exercise is presented in the Table below. In this Table, the Other Projects & Activities which were SCOPED-IN for cumulative evaluation in the environmental topic chapters are listed on the Y- axis and the relevant Environmental Factor topic is identified on the X - axis.

Table 5-10: List of Other Projects or Activities scoped-in for Cumulative Evaluation

Other Project or Activity *(These projects are identified on Figure CE 2.1: Other Projects or Activities Scoped In for Evaluation in the Environmental Factor Topic Chapters and are identified using the ID number on the mapping)*	**6. Population**	**7. Human Health**	**8. Biodiversity**	**9. Land**	**10. Soils**	**11. Water**	**12. Air**	**13. Climate**	**14. Material Assets: Built Services**	**15. Material Assets : Roads**	**16. Cultural Heritage**	**17. Landscape**
Killonan to Nenagh 110kV Overhead Line							■					
Shannonbridge – Killonan 220kV Overhead Line							■					
Potential Bunkimalta Windfarm and Consented Grid Connection	■	■	■			■		■	■			
Consented Castlewaller Windfarm and Potential Grid Connection	■	■	■			■	■	■	■	■		
Existing Milestone Windfarm			■								■	■
Existing Rear Cross Quarry			■									
Existing Foilnaman Mast											■	■

Section 5.6: Description of Other Projects included in Cumulative Evaluations

Other Project or Activity *(These projects are identified on Figure CE 2.1: Other Projects or Activities Scoped In for Evaluation in the Environmental Factor Topic Chapters and are identified using the ID number on the mapping)*	**6. Population**	**7. Human Health**	**8. Biodiversity**	**9. Land**	**10. Soils**	**11. Water**	**12. Air**	**13. Climate**	**14. Material Assets: Built Services**	**15. Material Assets : Roads**	**16. Cultural Heritage**	**17. Landscape**
Existing Cummermore Communications Pole											■	■
Proposed Quarry at Curraghduff			■									
Consented Newport Town Park			■			■						
Activity – Forestry, in the surrounding area			■									■
Activity – Agriculture, in the surrounding area			■									
Activity – Turf Cutting			■									
All operating wind turbines in the Irish State								■				

Description of the Development – UWF Grid Connection

Chapter 5

Relevant Volume C3 EIAR Figures

Figure CE 2.1: Other Projects or Activities Scoped In for Cumulative Evaluation in the Environmental Factor topic chapters

Relevant Volume C4 EIAR Appendices

Appendix 2.1 Scoping of Other Projects & Activities for the Cumulative Evaluations.

A brief overview of each of the above listed projects is provided over.

5.6.3.1 Electrical Utilities

Existing Killonan to Nenagh 110kV Overhead Line: A high voltage (110kV) overhead line which runs between Killonan Station and Nenagh ESB substation (County Tipperary). The existing line is located to the west of the UWF Grid Connection and does not pass over the route of the 110kV UGC. The new Mountphilips Substation will be connected to this line via two new End Masts in farmland, west of the substation compound.

Shannonbridge – Killonan 220kV Overhead Line: A high voltage (220kV) overhead line which runs between Shannonbridge ESB substation in County Offaly and Killonan ESB substation in County Limerick. A section of the line passes close to the UWF Grid Connection 110kV UGC in the townlands of Coole and Mountphilips.

5.6.3.2 Energy - Windfarms

Milestone Windfarm is an existing 4-turbine windfarm located adjacent to the southwest of the consented Upperchurch Windfarm, with 3 No. turbines consented under planning ref: 12510385 at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry and 1 No. turbine consented under planning ref: 1410 at Inchivara and Knockduff. Milestone Windfarm comprises 4 No. wind turbines (each with a maximum tip height of 126m) along with new access tracks, and electrical substation, and associated works. The grid connection associated with Milestone Windfarm is towards the south at ESBN Cauteen Station, cabled along the public road network. The UWF Grid Connection 110kV UGC and UWF Related Works Internal Windfarm Cabling will pass through a landholding associated with Milestone Windfarm, which is located on lands adjacent to Upperchurch Windfarm. An Environmental Impact Statement accompanied the planning applications for Milestone Windfarm – Ref: 12510385 & 1410.

Milestone Windfarm is constructed and therefore there will be no construction works during the construction of the subject development or any of the other elements of the Whole UWF Project. Therefore there will be no overlap of construction periods.

Consented Castlewaller Windfarm & Potential Grid Connection:

Consented Windfarm: 16 turbines and associated hardstands, electrical substation, internal underground cables, internal access roads, upgrading of existing internal access roads, borrow pits, expansion of drainage system and ancillary works. An Environmental Impact Statement and Natura Impact Statement accompanied the planning application 11/51/0251 for Castlewaller Windfarm.

Potential Grid Connection: The grid connection for Castlewaller Windfarm is neither currently consented nor proposed. In SID pre-application consultation, commenced in December 2018 with An Bord Pleanála for the grid connection element of Castlewaller Windfarm, the applicant (ABO Wind Ireland) indicated underground cabling to connect the windfarm to Killonan Station, near Limerick City. The *potential* route of this grid connection is predominantly on public roads. Part of the grid route is along the L6009-0, just east of Newport Town which will also be used for the UWF Grid Connection 110kV UGC. A *potential* site entrance off the R503 via an existing forestry entrance (along the UWF Grid Connection route) was also included in the SID Pre-Application consultations for the grid connection. It is assumed that any future application for the grid connection would be accompanied by an EIA Report. ABP Ref. 303293-19.

Overlap of Construction Periods: Although Castlewaller Windfarm is not likely to be constructed during the same period as UWF Grid Connection (because the Castlewaller Windfarm has not yet been offered a grid connection from EirGrid, and has to obtain planning consent for its grid connection), there is some possibility that this windfarm could be built during the same period as UWF Grid Connection, and therefore the Castlewaller Windfarm project is included in the cumulative evaluation on a precautionary basis.

In relation to downstream water quality and SACs: the consented windfarm is entirely located in the Newport (Tipperary)_SC_010 sub-catchment upstream of the Lower River Shannon SAC. The route of the *potential* grid connection is assumed, for the purposes of this EIA Report, to be routed along the public road, as indicated during the aforementioned SID Pre-Application consultations. And therefore it is assumed that the potential grid connection will be located in two of the same sub-catchments as UWF Grid Connection - Kileengarrif_SC_010 and Newport (Tipperary)_SC_010. The construction of the Castlewaller Windfarm and potential grid connection will involve both instream works and works in close proximity to watercourses. It is assumed that any future proposal for the grid connection will include Best Practice environmental protection measures, including surface water runoff and invasive species management, which will ensure adverse effects to the integrity of downstream SACs are avoided.

In relation to Hen Harrier and the SPA: Castlewaller Windfarm is also located within the Slievefelim to Silvermines SPA, with turbines located c.1.2km to the north of the UWF Grid Connection where the 110kV UGC is routed along the R503. This windfarm is located within areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts. As per planning conditions, Castlewaller Windfarm will be subject to significant management plans in respect of Hen Harrier. The potential grid connection is routed along forestry/windfarm roads and public roads where it occurs within the SPA. It is assumed that any future proposal for the grid connection will include protection measures for Hen Harrier which will ensure adverse effects to the integrity of the SPA are avoided.

Potential Bunkimalta Windfarm & Consented Grid Connection:

Potential Windfarm: c.34MW wind farm in potentially the same general location as the previously consented (and now annulled) windfarm comprising wind turbines, substation compound, access tracks, anemometer masts, potentially borrow pits and soils storage areas and associated site works. The potential windfarm is assumed, for the purposes of this EIA Report, to be located in the same townlands as the previous application – i.e. Bunkimalta, Bauraglanna, Lackabrack, Knockfune and Foilduff at Keeper Hill.

Consented Grid Connection: The Bunkimalta Windfarm (should it be permitted in the future) is expected to connect to the National Grid via the already consented underground grid connection to the existing Nenagh Substation, on the outskirts of Nenagh town. The consented grid connection comprises the installation of approximately 22.25km of 38kV underground cable (UGC) between Bunkimalta Wind Farm and Nenagh 110kV substation, to be installed primarily in public roads. Bunkimalta Windfarm is located c.3.5km to the north of the UWF Grid Connection. Modifications to the existing entrance from the L-2163 to the Keeper Hill Coillte Forest. The consented Grid Connection was accompanied by Environmental Reports. Planning Ref: 16600433 and 16600432.

Overlap of Construction Periods: 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. For the purposes of this EIA Report, the Bunkimalta Windfarm is assumed to be located in the same general area (as previously proposed), in the northern part of the upland area. The Bunkimalta Windfarm is assumed in this report to be similar to the previous application for 16 no. turbines and a substation compound.

In relation to downstream water quality and SACs: The potential (future) Bunkimalta Windfarm is assumed to be located within both the Kileengarrif_SC_010 sub-catchment and the Newport (Tipperary)_SC_010 sub-catchment, within the catchment area of the Lower River Shannon SAC. The grid connection (consented) is predominately within the public road corridor to Nenagh town and also is partially located within the Kileengarrif_SC_010 and Newport (Tipperary)_SC_010 sub-catchments, though it is not located close to the UWF Grid Connection. The *potential* Bunkimalta Windfarm is located upstream of the UWF Grid Connection only.

The construction of the *potential* Bunkimalta Windfarm and associated grid connection will involve both in-stream works and works in close proximity to watercourses. It is assumed that any future proposal will involve surface water and invasive species controls in line with Best Practice. It is assumed that any future proposal for a windfarm will include Best Practice environmental protection measures, including surface water runoff and invasive species management, which will ensure significant impacts to downstream SACs are avoided.

In relation to the Hen Harrier and the SPA: It is assumed, for the purposes of this EIA Report, that the *potential* Bunkimalta Windfarm will be located within the Slievefelim to Silvermines SPA, with turbines potentially located c.5km to the north of the UWF Grid Connection 110kV UGC route. Due to its location within an SPA, it is assumed that any future proposal for a windfarm will include protection measures for Hen Harrier which will ensure significant impacts to the SPA are avoided, and that any future proposed Bunkimalta Windfarm will only proceed where the windfarm can be developed without causing adverse effects to the integrity of the SPA.

It is assumed that any future application for the windfarm would be accompanied by an EIA Report and Natura Impact Statement.

Operating Wind Turbines in the Irish State: All wind turbines generating Electricity from Renewable Energy (RE-E). The generating capacity as of June 2019 was 3,700 MW installed throughout the country at 250 No. windfarms.

5.6.3.3 Quarries

Rear Cross Quarry: Rearcross Quarry is an operational quarry (8.5ha) which exists at Shanballyedmond townland c.1km to the south of the 110kV UGC along the Regional Road R503. The quarry is located in the Shannon regional catchment, to the south of Rear Cross village. Quarry operations only interface with 110kV UGC works at the point of egress from the quarry access road onto the R503. Hen Harrier and water protection measures form part of the planning conditions and licences for this quarry which ensure adverse impacts on European Sites are avoided. This project was accompanied by Environmental Reports and Appropriate Assessment Screening (Stage 1) Report. Planning Ref: 11510323

Note: the supply of aggregate to the UWF Grid Connection and Other Elements of the Whole UWF Project will be supplied as part of the consented capacity of the Rearcross Quarry, and no expansion of the quarry is required in relation to this supply.

Curraghduff Quarry: This quarry is currently in the planning permission process at Further Information Stage. (Tipperary County Council Ref. 19600317). The extraction of sandstone from a 3.585ha disused quarry site, which includes site entrance and access laneway. It is intended to extract between 590,000 - 690,000m^3 of sandstone and to install temporary settlement ponds. Quarry works to entail removal of sandstone by blasting and mechanical digger, dry screening and crushing and restoration of the area on completion of works. This application was accompanied by an NIS.

5.6.3.4 Utility - Existing Communication Structures

Foilnaman Mast: An existing communications mast comprising a 30m steel lattice mast structure at Knockmaroe townland, in the vicinity of the UWF Related Works/Upperchurch Windfarm site. Planning Ref: 10510462

Cummermore Communications Pole: An existing communications structure comprising a 20m support pole, c.2km to the southwest of the Upperchurch Windfarm, and within 4km of the UWF Related Works (Telecom Relay Pole). This existing pole carries radio aerials and a communications dish and associated equipment. Planning Ref: 14600313

5.6.3.5 Public Recreational Facility

Newport Town Park: A recently consented public park on lands immediately adjacent to the Newport River within the urban area of Newport town. The new park will incorporate children's play area, play equipment, zip wire, outdoor gym equipment, pump track, multi-use games area, recreational walkways, seating, signage, interpretive panels, landscaping and car parking. The development of Newport Town Park will involve excavations and groundworks within the boundary of the Lower River Shannon SAC. However, there will be no instream works, nor works within 5m, of the Newport River. Sediment control and water quality protection measures will be implemented, as conditioned by planning consent. Funding secured. To commence in 2019/2020 Planning Ref: PL92.302960

5.6.3.6 Activities – Forestry, Agriculture, Turf Cutting

Forestry in the Surrounding Area: General forestry activities in commercial conifer plantations in the surrounding area, includes management of growing forests, along with planting, thinning and harvesting activities. Roughly half of the surrounding landuse in the upland area relates to forestry.

Agriculture in the Surrounding Area: Agriculture is widespread throughout the study area and predominately comprises hill farming with more intensive grassland farming occurring at lower altitudes. General agricultural activities on agricultural lands in the surrounding area, includes dry stock farming, mainly cattle, along with some dairy farming, and some sheep farming. Roughly half of the surrounding landuse in the upland area relates to agriculture.

Turf-Cutting: General turf cutting activities which occur in pockets of peatlands in the surrounding upland area. Turf cutting carried out both mechanically and by hand, with cut-over bog evident at a number of locations including at Bleanbeg Bog, Cummermore, Gortmahonoge and at Cummer (Mulloghney).

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Figure GC 6.1	Location of the UWF Grid Connection
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Figure WP 6.2	Whole Project Study Area for Local Economy

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

List of Appendices

Appendix No.	Appendix Title
Appendix 6.1	Central Statistics Office & GeoDirectory Data

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

Glossary of Terms

Term	Definition
Electoral Districts (EDs)	Defined by the CSO as the smallest legally defined administrative areas in the State for which Small Area Population Statistics (SAPS) are published from the Census. There are 3,440 legally defined in the State.
National Economy	The economy of the Republic of Ireland. It encompasses the value of all goods and services manufactured within the country.
Local Economy	The economic system and range of economic activity in a local area that serves a local population.
Gross Domestic Product (GDP)	The measure of the value of total output of an economy in a given period
Gross Value Added (GVA)	The measure of the values of goods and services produced in an area, industry or sector of an economy
Induced Spending	Induced spending is the increased spending that is generated by increased incomes.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.

List of Abbreviations

Abbreviation	Full Term
BPM	Ecopower Best Practice Measure developed by members of the EIAR Team
UGC	Underground Cables
UWF	Upperchurch Windfarm

Topic **Population**

Executive Summary of the Population Chapter

Baseline Environment: Impacts on population are considered in the context of the local economy. The Study Area for the Local Economy is the Electoral Divisions (EDs) surrounding the development and includes the town of Newport and the villages of Rear Cross, Upperchurch and Hollyford in County Tipperary, and the town of Cappamore and the village of Murroe in County Limerick.

Survey Results for Sensitive Aspects in the Baseline Environment: The latest Census figures, Tipperary and Limerick County Development Plans and the GeoDirectory Database of Business and Residential Premises in the area were examined, along with a site visit to the area, to identify local services and businesses. There are no local residents in close proximity to the Mountphilips Substation site. Along the route of the 110kV UGC, residents and businesses are concentrated in and around Newport town and Rear Cross village. According to Census 2016, a significant proportion of the local workforce commutes to work, with the key employment sectors in the area being Commerce & Trade and Professional Services, so it is likely that they are accessing employment opportunities in the nearby urban areas, notably Limerick, Thurles and Nenagh. Agriculture and forestry are important sectors within the upland area, accounting for almost 10% of business premises and 13% of the workforce, higher than the State average of 4%. Tourism is relatively strong in Tipperary County however much of this concentrated in South Tipperary. Outside of Newport town, there are low numbers (c.12) of accommodation and food services premises in the study area. There are a number of walks and trails within the area; of these trails part of the Slievefelim Way walking trail and the Ormond Way Cycle route overlap the route of the 110kV UGC. A scenic driving route is also routed along the regional R503 and R497 regional roads in the upland area.

Summary of the likely Impact on Local Economy: There will be c.100 persons working directly on the UWF Grid Connection project, most of them on-site, over the course of the construction phase; c.€900,000 will be paid to local landowners, in the form of wayleave agreements and land purchases; c.€1.5 million will be spent regionally on Stone & Concrete from Rear Cross Quarry (Holycross) and Roadstone (Bunratty) and c.€500,000 expenditure on locally sourced goods and services will be generated. The impact is evaluated as **Neutral (Positive)** because the additional GVA generated, €2.9 million, is equivalent to approximately 1% per cent of the overall size of the local economy in the Study Area, in the year of construction; and because of the temporary duration of the construction stage. **Summary of the likely Cumulative Impact:** The UWF Grid Connection will be constructed with the Other Elements of the Whole UWF Project, notably Upperchurch Windfarm, and could also *potentially* be constructed during the same period as Castlewaller Windfarm and Bunkimalta Windfarm. The cumulative Gross Value Added for the 3 renewable energy projects (€7.35 million to €11.35 million), should they be constructed during the same period, is expected to be approximately 4% to 5% of the value of the local economy and therefore the cumulative significance is evaluated as an **Imperceptible (Positive)** Impact.

Other Population receptors/impacts: The Local Economy during the construction phase, was deemed to be the only Sensitive Aspect of Population which could be materially affected by the UWF Grid Connection and therefore was brought forward for evaluation more in-depth evaluation in this Population chapter (as summarised above). **Other likely impacts that could affect Population** are evaluated more directly in the other topic chapters. Effects on human health are evaluated in Chapter 7: Human Health; Effects of disruption to land users during construction are evaluated Chapter 9: Land; Effects to people of construction dust and noise, and operational noise and electromagnetic fields are evaluated in Chapter 12: Air; Potential effects to local people of interruption to water supply are evaluated in Chapter 14: Material Assets (Built Services); and Effects on road users of traffic disruption are evaluated in Chapter 15: Material Asset (Roads).

Conclusion: The UWF Grid Connection will not cause significant adverse effects to Population, effects will be positive.

Topic **Population**

6 Environmental Factor: Population

6.1 Introduction to the Population Chapter

6.1.1 What is Population?

Population relates to the people living in the area, and includes the demographic makeup, economic activity and social functioning of local communities.

6.1.2 Overview of Population in the Local Environment

UWF Grid Connection is located in County Tipperary. The surrounding area of the UWF Grid Connection is largely rural with agricultural grassland, commercial forestry plantations, public roads and private roads being the main land uses. Isolated residences and farmsteads are also scattered throughout the area. Nearby settlements include the villages of Upperchurch, Kilcommon and Rear Cross and Newport town.

The location of the UWF Grid Connection is illustrated on OSI Mapping on Figure GC 6.1: Location of the UWF Grid Connection**.**

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

6.1.3 Sensitive Aspects of the Population Environment included for further evaluation

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

Sensitive Aspect No. 1	Local Economy	Section 6.2

The above listed Sensitive Aspect is evaluated in Section 6.2 of this Chapter.

To help readers navigate, the colour code for the Sensitive Aspect used above is also used in the Sensitive Aspect Section 6.2. The colour-code has been applied to the section headings, tables and on side-tabs on the edge of the pages.

6.1.4 Sensitive Aspects excluded from further evaluation

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

National Economy	Rationale for exclusion: Neutral effects The National economy relates to economic activity and employment over the territory of the entire State. In 2018 national Gross Domestic Product (GDP) amounted to €324 billion, while Gross National Product (GNP), which nets out the profits of foreign-owned companies, amounted to €253 billion.[1] At a national level, the financial transactions (positive impact) associated with the construction and operation of the UWF Grid Connection alone and cumulatively with the Other Elements of the Whole UWF Project will be very low, representing substantially less than 1% of the national economy and therefore will have a neutral effect on the national economy.
Settlement Patterns	Rationale for exclusion: Impacts will be Neutral The financial transactions (positive) and business disruption impacts (negative) during the construction and operation of the UWF Grid Connection alone and cumulatively with the Other Elements of the Whole UWF Project, will not be of a nature as to impact on local settlement patterns i.e. it will not require or result in the temporary or permanent relocation of business or population.[2]
Land Users	Rationale for exclusion: Evaluated in Chapter 9: Land
Local Residents & Community,	Rationale for exclusion: Evaluated in Chapters 7: Human Health; Chapter 12: Air; Chapter 17: Landscape.
Transient People (which includes tourists)	Rationale for exclusion: Evaluated in Chapters 7: Human Health; Chapter 12: Air; Chapter 17: Landscape. Note: Tourism revenue is evaluated as part of Local Economy Sensitive Aspect.
End users of Built Services	Rationale for exclusion: Evaluated in Chapter 14: Material Assets - Built Services
Road Users	Rationale for exclusion: Evaluated in Chapter 15: Material Assets - Roads

[1] https://www.cso.ie/en/releasesandpublications/ep/p-nie/nie2018/expenditure/

[2] As per the Tipperary Wind Strategy Policy (2016), 'By their nature, wind farm developments are typically located on more elevated, isolated locations which coincide with lower population densities...' See http://www.tipperarycoco.ie/sites/default/files/Tipperary%20Wind%20Energy%20Strategy%202016.pdf

6.1.5 Overview of the Subject Development

The UWF Grid Connection is the subject development, being the subject of a current application to An Bord Pleanála. The main parts of the UWF Grid Connection are identified in Table 6-1 below.

Table 6-1: 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 EIAR Main Report).

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

6.1.5.1 Changes to the development from the 2018 Application

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 entrance 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 Site 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.

6.1.6 The Authors of the Population Chapter

This report has been written by John Lawlor (M. Econ. Sc. Hons), Director at EY-DKM Economic Advisory Services (EY-DKM) and Ciara Morley (Ph.D. Finance), Manager with EY-DKM. John has over 20 years' experience of economic analysis with EY-DKM and DKM, and prior to that worked in the Environmental Policy Research Centre of the ESRI. Ciara works on issues in the Irish and global economy and in the areas of urban economics, transport, construction and tourism, and also previously worked in the ESRI. EY-DKM Economic Advisory Services was formed following the acquisition of DKM Economic Consultants by EY (Ernst and Young) in 2018.

6.1.7 Sources of Baseline Information

The information sources outlined in Table 6-2 were reviewed during desktop studies and confirmed during fieldwork in order to gather information on the baseline environment. The recommendations in the guidelines listed in the table, have been considered during the preparation of this chapter.

Table 6-2: Sources of Baseline Information for Population

Type	Source
Consultation	Feedback was received from • Fáilte Ireland • Members of the public during the Public Information Day See Chapter 3: The Scoping Consultations, and Appendices for further details.
Legislation, Regulations & Policy	• Mid-West Regional Planning Guidelines 2010-2022 • North Tipperary County Development Plan 2010 (as varied in 2016) • South Tipperary County Development Plan 2009 (as varied in 2016) • Limerick County Development Plan 2010-2016 • Newport Local Area Plan 2010-2016
Desktop	• Census of Population 2016 and 2011, various volumes published by the CSO. • GeoDirectory database of business and residential premises. In co-ordination with and by review of the other EIA Report Chapters as follows: • Chapter 12: Air • Chapter 15: Material Assets – Roads • Chapter 17: Landscape • Review of planning/ environmental information documents for the Other Elements of the Whole UWF Project as contained in Volume F of the planning application
Fieldwork	• Site Visit to assess extent of local businesses and populations

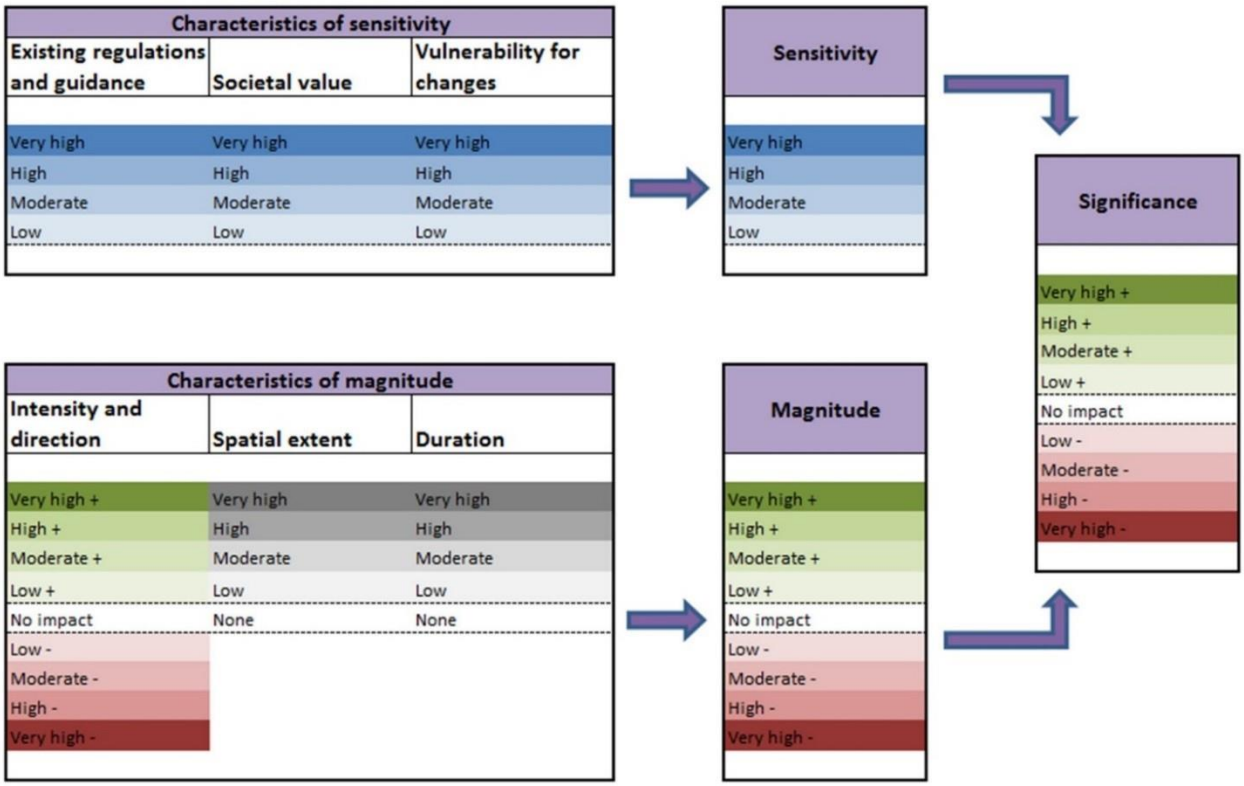
6.1.8 Methodology used to Describe the Baseline Environment and to Evaluate Impacts

European Commission Guidance: As outlined in the Guidance on the preparation of the Environmental Impact Assessment Report (EC, 2017), it is important to ensure that methods employed in a population assessment are proportionate and tailored to meet the assessment requirements of the project in question, which can differ considerably depending on the scale and nature of a proposal, but are further influenced by local context and varying community circumstance and sensitivity.

As there are no industry guidelines/standards for the evaluation of socio-economic related effects to population, a standard methodology – using the IMPERIA methodology – is employed. The IMPERIA methodology is described in Section 6.1.8.1 below.

6.1.8.1 Overview of the IMPERIA Methodology

In the framework developed under the EC LIFE project - IMPERIA, the evaluation of impact significance uses a replicable, multi-criteria decision analysis, where the sensitivity of the receptor (i.e. the sensitivity of a Sensitive Aspect of the environment) and the magnitude of the change caused by a project are rated using sub-criteria or scales, and then the overall significance is evaluated using a matrix.



The criteria for determining the overall sensitivity of a receptor and magnitude of the change (impact) to the receptor, is provided in the tables below. The matrix for determining the significance of the impact to the receptor is provided after these tables.

6.1.8.1.1 Criteria for Evaluating the Sensitivity of a Receptor

Sensitivity of the receptor is a description of the characteristics of the receptor or aspect of the environment which will be affected by the development. It is a measure of 1) existing regulations and guidance, 2) societal value and 3) vulnerability for the change. The sensitivity of a receptor is estimated in its current state prior to any change implied by the project.

Existing regulations and guidance describes whether there are any such objects in the impact area, which have some level of protection by law or other regulations (e.g. prohibition against polluting groundwater and Natura areas), or whose conservation value is increased by programs or recommendations (e.g. landscapes designated as nationally valuable).

Societal value describes the value of the receptor to the society and depending on the type of impact may be related to economic values (e.g. water supply), social values (e.g. landscape or recreation) or environmental values (e.g. natural habitat). Societal value measures general appreciation from the point of view of the society. When relevant, the number of people impacted is taken into account.

Vulnerability for the change describes how liable the receptor is to be influenced or harmed by changes to its environment.

Sensitivity	Criteria Existing regulations/guidance	Criteria Societal value	Criteria Vulnerability to change
Low	Few or no recommendations which add to the conservation value of the impact area, and no regulations restricting use of the area (e.g. zoning plans).	The receptor is of small value or uniqueness. The number of people impacted is small.	Even a large external change would not have substantial impact on the status of the receptor. There are only few or none vulnerable receptors in the area.
Moderate	Regulation sets recommendations or reference values for an object in the impact area, or the project may impact an area conserved by a national or an international program.	The receptor is valuable and locally significant but not very unique. The number of people impacted is moderate.	At least moderate changes are needed to substantially change the status of the receptor. There are some vulnerable receptors in the area.
High	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas).	The receptor is unique and valuable to society. It may be deemed nationally significant and valuable. The number of people impacted is large.	Even a small external change could substantially change the status of the receptor. There are many vulnerable receptors in the area.
Very High	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas).	The receptor is highly unique, very valuable to society and possibly irreplaceable. It may be deemed internationally significant and valuable. The number of people affected is very large.	Even a very small external change could substantially change the status of the receptor. There are very many vulnerable receptors in the area.

The **overall sensitivity of a receptor** is assessed by the competent expert on the basis on his/her assessment of the components of sensitivity. A general guide for deriving the overall sensitivity is to pick the maximum of existing regulations and guidance and societal value and then adjust that value depending on the level of vulnerability.

Determining the Overall Sensitivity of a Receptor	
Low	The receptor has minor social value, low vulnerability for the change and no existing regulations and guidance. Even a receptor which has major or moderate social value may have low sensitivity if it's not liable to be influenced by the development.
Moderate	The receptor has moderate value to society, its vulnerability for the change is moderate, regulation may set reference values or recommendations, and it may be in a conservation program. Even a receptor which has major social value may have moderate sensitivity if it has low vulnerability, and vice versa.
High	Legislation strictly conserves the receptor, or it is very valuable to society, or very liable to be harmed by the development.
Very High	Legislation strictly conserves the receptor, or it is irreplaceable to society, or extremely liable to be harmed by the development. Even minor influence by the proposed development is likely to make the development unfeasible.

6.1.8.1.2 Criteria for Evaluating the Magnitude of an Impact

Magnitude of the impact describes the characteristics of the changes or effects that the planned project is likely to cause. Magnitude is a combination of 1) intensity and direction, 2) spatial extent, and 3) duration. Assessment of magnitude evaluates the likely changes affecting the receptor *without* taking into account the receptors sensitivity to those changes.

Intensity describes the physical dimension of a development. The direction of the change/effect is either positive (green) or negative (red).

Magnitude	**Criteria – Intensity & Direction**
Very High	The proposal has an extremely beneficial effect on nature or environmental load. A social change benefits substantially people's daily lives.
High	The proposal has a large beneficial effect on nature or environmental load. A social change clearly benefits people's daily lives.
Moderate	The proposal has a clearly observable positive effect on nature or environmental load. A social change has an observable effect on people's daily lives.
Low	An effect is **positive** and observable, but the change to environmental conditions or on people is small.
No impact	An effect so small that it has no practical implication. Any benefit or harm is negligible.
Low	An effect is **negative** and observable, but the change to environmental conditions or on people is small.
Moderate	The proposal has a clearly observable negative effect on nature or environmental load. A social change has an observable effect on people's daily lives and may impact daily routines.
High	The proposal has a large detrimental effect on nature or environmental load. A social change clearly hinders people's daily lives.
Very High	The proposal has an extremely harmful effect on nature or environmental load. A social change substantially hinders people's daily lives.

Spatial extent describes the geographical reach of, or the range within which, an effect is observable.

Duration describes the length of time during which an impact is observable and it also takes other related issues such as timing and periodicity into account. These are relevant for impacts which aren't observable all the time such as periodic impacts.

Magnitude	Criteria Spatial Extent	Criteria Duration
Low	Impact extends only to the immediate vicinity of a source. Typical range is < 1 km.	An impact whose duration is at most one year, for instance during construction and not operation. A moderate-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance.
Moderate	Impact extends over one municipality. Typical range is 1-10 km.	An impact lasts from one to a number of years. A long-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance.
High	Impact extends over one region. Typical range is 10-100 km.	An impact lasts several years. The impact area will recover after the project is decommissioned.
Very High	Impact extends over several regions and may cross national borders. Typical range is > 100 km.	An impact is permanent. The impact area won't recover even after the project is decommissioned.

Deriving the overall magnitude of the change from components of magnitude

Magnitude of the change is a comprehensive synthesis of its component factors. In a case, where intensity, spatial case and duration all get the same value, the magnitude would also be given this value. In other cases, intensity should be taken as a starting point, and the assessment should be adjusted based on spatial extent and duration to obtain an overall estimate. The aim is that the overall assessment should capture the characteristics of an effect. The table below describes some example descriptions of different categories for the magnitude of the change.

Determining the Overall Magnitude of the Change/Effect	
Very High	The proposal has beneficial effects of very high intensity and the extent and the duration of the effects are at least high.
High	The proposal has beneficial effects of high intensity and the extent and the duration of the effects are high.
Moderate	The proposal has clearly observable positive effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
Low	An effect is positive and observable, but the change to environmental conditions or on people is small.
No impact	No change is noticeable in practice. Any benefit or harm is negligible.
Low	An effect is negative and observable, but the change to environmental conditions or on people is small.
Moderate	The proposal has clearly observable negative effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
High	The proposal has harmful effects of high intensity and the extent and the duration of the effects are high.
Very High	The proposal has harmful effects of very high intensity and the extent and the duration of the effects are at least high.

6.1.8.2 Assessing the significance of an impact

The **assessment of the overall significance uses the matrix below,** where positive impacts are in green and negative in red. The matrix is based on the **magnitude of the change** affecting a receptor and on the **sensitivity of the receptor** to those changes.

The values obtained from the table are indicative because the most relevant dimensions for characterising an impact are dependent on the type of impact. Thus, some discretion from the expert is required, in particular in cases, where the one component is low and the other one high or very high.

Determining the Overall Significance of an Impact

Impact Significance		Magnitude of change								
		Very High	**High**	**Moderate**	**Low**	**No Change**	**Low**	**Moderate**	**High**	**Very High**
Receptor Sensitivity	**Low**	Significant*	Moderate*	Slight	Imperceptible	Neutral	Imperceptible	Slight	Moderate*	Significant*
	Moderate	Significant	Significant	Moderate	Slight	Neutral	Slight	Moderate	Significant	Significant
	High	Profound	Significant	Significant	Moderate*	Neutral	Moderate*	Significant	Significant	Profound
	Very High	Profound	Profound	Significant	Significant*	Neutral	Significant*	Significant	Profound	Profound

* Especially in these cases, significance might get a lower estimate, if sensitivity or magnitude is near the lower bound of the classification

Note on Terms used in 'Determining the Overall Significance of an Impact' Table: *The Significance rating ascribed in the Table above have been refined from the ARVI tool, to provide a more nuanced understanding of the significance and also to be compatible with the terms used throughout this EIA Report, which have been informed by the EPA Guidelines on Information to be contained in EIAR (2017) for description of effects.*

In the above Table - Low has been refined as Slight or Imperceptible depending on context; High has been renamed as Significant; Very High has been renamed as Profound; No Impact is understood to also mean Neutral effect, which is defined in the EPA Guidelines as 'no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error'.

6.1.9 Certainty and Sufficiency of the Evaluation/Information

There is no specific guidance on the production of a Population chapter of an EIA Report, with respect to economic activity and employment. However, extensive experience with EIA and planning systems together with the EPA guidance on EIS preparation (2002 & draft 2017) and the application of the IMPERIA methodology, has informed the production of this chapter.

Baseline data and trends for the local population have been derived from a range of national statistical data sources which annually collect and report statistics for geographic areas across the whole of Ireland. Data was sourced from the Central Statistic Offices Census 2011 and Census 2016 and from GeoDirectory.

The Sensitivity of the Local Population to change or to impacts by UWF Grid Connection has been calculated based on the EU IMPERIA LIFE project, this methodology is included in Section 6.1.8 of this Report.

There is some degree of uncertainty around future trends, particularly in relation to international market influences such as Brexit, which are difficult to predict. However, on the basis that these future trends are not anticipated to change enough to alter the baseline scenario when compared to the national average, the baseline environment information provided within this chapter is considered sufficient for the purpose of this assessment.

In respect of Population no significant limitations or difficulties were encountered.

6.2 Sensitive Aspect No.1: Local Economy

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

6.2.1 BASELINE CHARACTERISTICS of Local Economy

6.2.1.1 STUDY AREA for Local Economy

The study area for Local Economy in relation to the UWF Grid Connection is described in Table 6-3 and illustrated on Figure GC 6.2: UWF Grid Connection Study Area for Local Economy (Volume C3 EIAR Figures).

Table 6-3: UWF Grid Connection Study Area for Local Economy

Study Area for Local Economy	Justification for the Study Area Extents
Electoral Divisions (EDs): Kilcomenty, Newport, Killoscully, Kilnarath, Abington[3], Foilnaman, Upperchurch, Glengar and Curraheen in County Tipperary; and Glenstal, Doon West and Bilboa in County Limerick	Includes surrounding urban areas containing local businesses and local labour force that could potentially be impacted by the UWF Grid Connection.

6.2.1.2 Baseline Context and Character of Local Economy in the UWF Grid Connection Study Area

The UWF Grid Connection Study Area is located in the Slievefelim to Silvermines upland area, and includes the town of Newport and the villages of Rear Cross, Upperchurch and Hollyford in County Tipperary, and the town of Cappamore and the village of Murroe in County Limerick. Along the UGC 110kV cable route residents are concentrated in Newport town and Rear Cross village.

Population: In Census 2016, the population of the UWF Grid Connection Study Area was 7,966 persons. The population has generally been growing steadily (in line with the State average) over the previous 20 years. Of note is Newport, which has a rapidly growing population, doubling in size from 1,536 in 1996 to 2,949 in 2016, most likely as a result of its proximity to Limerick city. The EDs which make up the UWF Grid Connection Study Area are located in the Mid-West region, which accounts for approximately 10 per cent of the national population of 4.8 million people. With the exception of Newport, the UWF Grid Connection Study Area is typical of a rural upland area in Ireland and is sparsely populated, with a population density below the State average.

Gross Value Added: CSO data for incomes and the economy is available at a regional level rather than at a county or sub-county level. The UWF Grid Connection Study Area is in the Mid-West Region which comprises Tipperary North, Limerick, and County Clare[4]. In 2014, the latest year for which the regional data is available, GDP per person in the Mid-West region was €29,196, below the State average of €42,040; while GVA stood at €26,695 per person, again below the State average of €38,267[5]. Based on the 2016 population of the UWF Grid Connection Study Area (7,966 persons), the size of the local economy within the UWF Grid Connection

[3] Abington is located in both Counties Tipperary and Limerick

[4] The former North Tipperary forms part of the Mid-West NUTS III area while the former South Tipperary is in the South-East NUTS III area. The unified county is fully incorporated in Southern Assembly region. Arising from the strong linkage between the northern part of the county and Limerick and between the southern part and Waterford, the 3 Tipperary assembly members will be members of both the Mid-West and South-East Strategic Planning Areas (SPAs). Source: http://www.southernassembly.ie/regional-planning/mid-west-spa

[5] GDP and GVA data for most regions are available up to 2017, but are suppressed for the Mid-West region from 2015 onwards, for confidentiality reasons. https://www.cso.ie/en/releasesandpublications/er/cirgdp/countyincomesandregionalgdp2016/

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Study Area is estimated at €213 million in GVA terms. Detailed data from the Census of Population and GeoDirectory is included in Appendix 6.1: Central Statistics Office & GeoDirectory Data (see Volume C4: EIAR Appendices).

Census data from 2016 indicates that a significant proportion of the local workforce commutes to work, and that the key employment sectors in the study area are Commerce & Trade and Professional Services. So it is likely that they are accessing employment opportunities in the nearby urban areas, notably Limerick, Thurles and Nenagh. Agriculture and forestry are also notable sectors in the study area, accounting for 10 per cent of business premises and 13 per cent of the workforce, higher than the State average of 4 per cent[6].

Tourism is relatively strong in Tipperary County however much of this is driven by South Tipperary, with only 28 per cent of tourists to the county in 2016 travelling to North Tipperary (where the County Tipperary EDs comprising the study area are located). Data indicates the revenue generated by overseas visitors to North Tipperary in 2016 accounted for 39 per cent of all tourism revenues in County Tipperary[7].

Walking and hiking are popular tourism pursuits in Ireland. Fáilte Ireland's *Tourism Facts 2017*[8] indicates that walking/cross country hiking was by some margin the most cited activity by international tourists in Ireland, while for domestic holidaymakers it was the second most cited activity. The importance of walking/hiking to Tipperary's tourist product is highlighted in the Tipperary *Strategic Tourism Marketing, Experience & Destination Development Plan 2016-2021*.[9] The Strategy refers to the village of Upperchurch as "a gateway to the Slieve Felim Mountains and environs as a walking destination. The location of the village is very lovely and although not far from Thurles in miles, feels like a million miles away." It designates the village as a "priority Level 2 village with strategic potential".

Outside of Newport town, there are low numbers (c.12) of accommodation and (no.3) food services scattered throughout the UWF Grid Connection Study Area. These tourism services are identified on Figure GC 6.2.

There are a number of walks and trails within the UWF Grid Connection Study Area; the Ballyhourigan Loop, Keeper Hill Walk; Clare Glens Loop; Slievefelim Way; Kilcommon Pilgrim Walk; Ormond Way Cycle; Multeen Way; Ormond Way Walk; Eamonn an Chnoic Walk; and Knockalough Loop. These trails are identified on Figure GC 6.2. Of these trails, the 110kV UGC works will overlap with the routes of the Slievefelim Way walking trail and the Ormond Way Cycle route only. A scenic driving route is also routed along the regional R503 and R497 regional roads.

6.2.1.3 Importance of Local Economy

The local economy is key to Population well-being, and sustains and underpins the structures of society. Through economic activity and employment, the local economy generates incomes for the population, which enables individuals and families to prosper and achieve their social aspirations, all of which is important in creating sustainable local communities. These issues are particularly important at a local level for a predominantly rural area, where the range of economic opportunities is limited compared to larger more urban areas.

Population
Topic

[6] CSO Census of Population 2016.
[7] http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Regional-tourism-performance-in-2016-(Revised-March-2018.pdf?ext=.pdf
[8] http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/5_International_Tourism_Trends/Tourism-Facts-2017_1.pdf?ext=.pdf
[9] http://www.tipperarycoco.ie/sites/default/files/Publications/Tipperary%20Tourism%20Development%20Strategy%202016%20-%202021.pdf

6.2.1.4 Sensitivity of Local Economy

Within the study area, four EDs have experienced falling population in the past 20 years; with Templederry in particular experiencing a population decline of 39 per cent between 1996 and 2016 (see Table 1 in Appendix 6.1). This may be an indication of limited economic opportunities in these areas.

Brexit also represents a particular sensitivity. According to a recent paper by the Irish Farmers Association (IFA) [10], 40 per cent of food exports from Ireland go to the UK. Potential impacts from Brexit are therefore likely to be particularly felt by the agriculture sector.

Broadly speaking, tourism is also sensitive to global uncertainties. The most immediate impact facing tourism in Ireland is the threat of euro-sterling parity which could see a large drop in the number of tourists visiting Ireland from the UK.

Based on the IMPERIA methodology, outlined in Section 6.1.8, the Local Economy is considered to have '**Low Sensitivity'** as 'even a large external change would not have substantial impact on the status of the local economy, which has few or none vulnerable receptors in the study area'.

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

There is limited data on trends in the Local Economy. In terms of population in the area, data from the past 10 years of Censuses suggests that population growth peaked in the decade to 2016, with a notable slowdown in population growth in the last five years recorded in Census 2016. Within the study area, Newport town has experienced rapid population growth, doubling in population between 1996 and 2016.

Disposable incomes (per person) in the Mid West continue to increase from their lowest recession levels in 2010. In the intervening six years, to 2016 (latest data available), disposable income has increased by 4.2% in the Region. Disposable income in the Mid-West (€20,306) is the highest of all the regions outside of Dublin (€24,449).

Fáilte Ireland's *Tourism Facts* for recent years point to very strong growth in both international and domestic tourist numbers in Ireland. The statistics confirm that walking and hiking have maintained their strong popularity for tourists as overall numbers have grown, pointing to growing opportunities for locations and business catering for these activities.

6.2.1.6 Receiving Environment (the Baseline + Trends)

It is anticipated that construction of the subject development will commence in late 2020 or 2021 and as such economic forecasts for 2018 through 2021, as described above, are relevant.

In relation to operational impacts, the UWF Grid Connection will be operated on a permanent basis. While forecasting the level of economic change that will occur over this timeframe is beyond the scope of this appraisal, it can be expected that the local economy will change over this period. It is assumed in this EIAR that the area will remain predominantly rural, and as such agriculture and forestry are likely to remain important. Under moderate assumptions, the CSO projects that the State population will increase by 19% from 4.7 million people in 2016 to 5.6 million by 2046.[11] Should local populations grow in tandem; the population of the UWF Grid Connection Study Area will grow by from 7,966 to c.9,480 persons by 2046.

[10] See https://www.ifa.ie/wp-content/uploads/2017/03/763773Brexit-imperatives-policy-paper55629.pdf
[11] http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2013/poplabfor2016_2046.pdf

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6.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

6.2.2.1 Cumulative Evaluation Study Areas

6.2.2.1.1 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 Grid Connection Cumulative Evaluation Study Area for Local Economy	Justification for the Study Area Extents
Electoral Divisions (EDs): Kilcomenty, Newport, Killoscully, Kilnarath, Abington[12], Foilnaman, Upperchurch, Glengar and Curraheen in County Tipperary; and Glenstal, Doon West and Bilboa in County Limerick	Includes EDs containing local businesses and local labour force that could potentially be impacted by the UWF Grid Connection alone and cumulatively with other projects

The study is illustrated on Figure CE 6.2: UWF Grid Connection Cumulative Evaluation Study Area for Local Economy.

6.2.2.1.2 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 6.2.2.2.1 below

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 6-4 and the study area is illustrated on Figure WP 6.2: Whole Project Study Area for Local Economy.

Table 6-4: Whole Project Cumulative Evaluation Study Area for Local Economy

Cumulative Project	Whole Project Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Slieve Felim to Silvermines Uplands Area comprising the Electoral Divisions (EDs) of Kilcomenty, Newport, Killoscully, Kilnarath, Abington, Foilnaman, Upperchurch, Gortakelly Dolla, Templederry, Borrisoleigh, Glengar, Curraheen, Cappagh, Donohill, Clonoulty West, Clogher, Moyaliff, Greenhall/ Lackagh and Kilmore in County Tipperary and Glenstal, Doon West, Cappamore and Bilboa in County Limerick	Electoral Districts comprising the general extent of the Slievefelim to Silvermines uplands area.
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm		
Element 5: UWF Other Activities		

Population

Topic

[12] Abington is located in both Counties Tipperary and Limerick

6.2.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Local Economy 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 Economy 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 Cumulative Evaluations (Section A2.1 .4.1).

The results of this scoping exercise are that: Bunkimalta Windfarm (potential windfarm and consented grid connection) and Castlewaller Windfarm (consented windfarm and potential grid connection) have been scoped in for evaluation of cumulative effects to the Local Economy.

6.2.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Local Economy

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 Economy. The results of this evaluation are included in Table 6-5.

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 6.2. The baseline character of the areas around these projects is described in Section 6.2.2.3.

Table 6-5: 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	Evaluated as excluded: Impacts will be Neutral due to UWF Replacement Forestry is located in Foilnaman Electoral Division, which has a population of 333 people in 2016 (CSO). Based on a population of 333 persons and a regional GVA per person of €26,695, the Local Economy of Foilnaman ED is estimated to have a GVA of €8.9 million. The trees required for the UWF Replacement Forestry will be sourced from a nursery (Dundrum or further afield) located outside the Foilnaman Electoral District and just outside the wider Cumulative Evaluation Study Area for the Whole UWF Project. At a local scale, the financial transactions (positive impact) associated with the Replacement Forestry will be very low. Capital expenditure will be greatest during the planting stage and will represent approximately 1% of the GVA for Foilnaman ED.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Impacts will be Neutral due to: At a local scale, the financial transactions (positive impact) associated with the UWF Other Activities (Haul Route Activities, Overhead Line Activities, Monitoring Activities and the Upperchurch Hen Harrier Scheme) will be very low in the context of the size of the local economy. Specifically in relation to the Haul Route Activities, no business disruption is likely given the location of these Activities on the verges of regional and national roads, the small extent and momentary to temporary duration of the activities.
Other Projects or Activities	
Bunkimalta Windfarm Castlewaller Windfarm	Yes, included for the evaluation of cumulative effects

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6.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

The population of the Cumulative Evaluation Study Area was 15,323 in 2016, with GVA in the Mid-West region at €26,695 per person (latest value 2014), therefore the value of the Local Economy in the Cumulative Evaluation Study Area is €409 million.

6.2.2.3.1 Element 2: UWF Related Works

The UWF Related Works are located in two EDs – Upperchurch and Foilnaman, which include the village of Kilcommon. Upperchurch village lies immediately adjacent to Upperchurch ED in the ED of Gortakelly. Due to its proximity, Gortakelly is also included in the study area.

In Census 2016, the population of the UWF Related Works Study Area was 1,176 persons. Over the previous 20 years, population increases of between 13% and 20% have occurred in Foilnaman and Gortakelly EDs, while a population decrease of 9% has occurred in Upperchurch ED. Overall the population has increased by 9.5% in the three EDs of Foilnaman, Upperchurch and Gortakelly.

Based on the total population of the Foilnaman, Upperchurch and Gortakelly EDs (1,176 persons), and a GVA per person of €26,695, the Local Economy is estimated to have a GVA of €31.4 million.

In 2014, disposable income per person was approximately 4 per cent lower in Tipperary, compared to the State average of €20,638.[13]

Agriculture and forestry accounted for 78 per cent of business premises. Across the study area some 17 per cent of the workforce was engaged in Agriculture, Forestry & Fishing, higher than the State average of 4 per cent[14] (see Table 6 in Appendix 6.1).

As indicated on Figure WP 6.2, there are a very small number (c.4) Accommodation or (c.1) Food Services within the Electoral Districts in the UWF Related Works area

The Eamonn a Chnoic Loop, Ormond Way (currently under development), and the Ormond Way Cycle route are located in the area.

6.2.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 6.2.2.2.1

6.2.2.3.3 Element 4: Already Consented Upperchurch Windfarm

The Upperchurch Windfarm is located in two EDs – Upperchurch and Foilnaman, which include the village of Kilcommon. Upperchurch village lies immediately adjacent to Upperchurch ED in the ED of Gortakelly. The villages of Rear Cross and Borrisoleigh are located in the surrounding EDs of Abington and Borrisoleigh (both County Tipperary). The baseline characteristics of the UWF Related Works area above, also relates to the Upperchurch Windfarm.

Consideration of the Passage of Time: Local Economy was not explicitly evaluated in the 2013 and 2014 assessments for the consented Upperchurch Windfarm. However, this environmental factor is now considered in the evaluations in this EIAR for UWF Grid Connection, and a cumulative evaluation is carried out for Upperchurch Windfarm

6.2.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 6.2.2.2.1

Population

Topic

[13] https://www.cso.ie/en/releasesandpublications/er/cirgdp/countyincomesandregionalgdp2016/

[14] CSO Census of Population 2016.

6.2.2.3.5 Other Projects or Activities

Bunkimalta Windfarm – potential 34MW windfarm, possibly comprising approximately 16 turbines and substation, with a consented underground grid connection mainly along roads to Nenagh town. The potential Bunkimalta Windfarm is potentially located in the EDs of Greenhall/Lackagh, Kilnarath and Abington. In Census 2016, the population of these EDs was 1,297 persons, this equates to a GVA of the local economy of €34.6 million.

Castlewaller Windfarm, if constructed, will consist of 16 turbines and one substation, located in the ED of Kilnarath, with a potential site entrance off the R503 and a potential underground grid connection mainly along public roads to Killonan Station on the outskirts of Limerick. In Census, the population of Kilnarath ED was 330 persons, this equates to a GVA of the local economy of €8.8 million.

Note: Although neither of these windfarms are likely to be constructed during the same period as UWF Grid Connection (because the Castlewaller Windfarm has not yet been offered a grid connection from EirGrid, and has to obtain planning consent for its grid connection; and because Bunkimalta Windfarm has to obtain new planning consent for the windfarm), there is *some possibility* that these windfarms could be built during the same period as UWF Grid Connection, and therefore there is potential for cumulative impacts (positive) to the local economy.

6.2.2.4 Cumulative Information Baseline Characteristics - Sensitivity of Local Economy

Within the study area, one of the three EDs – Upperchurch, has experienced a fall in population in the past 20 years, with a decline of 9 per cent between 2011 and 2016 (see Table 1 in Appendix 6.1). This may be an indication of reducing economic opportunities in this area.

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6.2.3 PROJECT DESIGN MEASURES for Local Economy

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 Mitigation Measures specific to Local Economy.

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6.2.4 EVALUATION OF IMPACTS to Local Economy

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 Economy.

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

Table 6-6: 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)*
Gross Value Added to Businesses & Employment Opportunities (construction stage)	*Business disruption (construction stage)*
	Reduction in tourism revenue (construction stage)
	Gross Value Added to Businesses & Employment Opportunities (operational stage)
	Reduction in tourism revenue (operational stage)

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the next section - **Section 6.2.4.1**.

The source-pathway-receptor links and the rationale for impacts excluded are described in the section directly after the Impact Evaluation Table in Section 6.2.4.2.

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6.2.4.1 Impact Evaluation Table: Gross Value Added to Businesses & Employment Opportunities

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction contracts, purchasing of material and services, landowner payments
Cumulative Impact Source: Construction contracts, purchasing of material and services, landowner payments
Impact Pathway: Financial transactions

Impact Description: An increase in gross value added to business and employment opportunities in the study area due to the purchase of goods, materials and services, employment, and payments to landowners, which will also result in secondary induced spending in the local economy.

Impact Quality: **Positive**

Evaluation of the Subject Development Impact – Gross Value Added to Business & Employment Opportunities

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

- c.100 persons working directly on the project, most of them on-site, over the course of the construction phase
- c.€0.9 million to local landowners, in the form of wayleave agreements and land purchases
- c.€1.5 million to be spent regionally on Stone & Concrete from Rear Cross Quarry (Holycross) and Roadstone (Bunratty).
- c.€500,000 induced expenditure on locally sourced goods and services
- The total Gross Value Added, is expected to be approximately 1% of the value of the local economy of the UWF Grid Connection Study Area (estimated at €213 million)

Significance of the Impact: Neutral (positive)

Rationale for Impact Evaluation:

- the Low sensitivity of the local economy
- the Low magnitude of the effect -the additional GVA generated, €2.9 million, is equivalent to approximately 1% per cent of the overall size (estimated at €213 million) of the local economy in the UWF Grid Connection Study Area, in the year of construction.
- Temporary duration of the construction stage.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: UWF Grid Connection is expected to be constructed at the same time as the other elements of the Whole UWF Project, in addition, although unlikely, Bunkimalta Windfarm and Castlewaller Windfarm could potentially could be constructed at the same time as UWF Grid Connection. Cumulative local impacts include:

- c.460 persons (200 UWF Grid connection and Other Elements, 130 Bunkimalta Windfarm, 130 Castlewaller Windfarm) working directly on the projects, most of them on-site, over the course of the construction phase
- c.€1.15 million to local landowners (UWF Grid Connection and the Other Elements) in the form of wayleave agreements, option payments and land purchases.
- Between c.€3.2 million (UWF Grid Connection and Other Elements of Whole UWF Project) and circa €7.2 million (if Bunkimalta Windfarm and Castlewaller Windfarm source stone regionally) to be spent regionally on Stone & Concrete from Rear Cross Quarry (Holycross) and Roadstone (Bunratty)

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• C.€3 million induced expenditure on locally sourced goods and services In total, the cumulative Gross Value Added for the 3 projects (€7.35 million to €11.35 million) being constructed during the same period, is expected to be approximately 4% to 5% of the value of the local economy of the UWF Grid Connection Cumulative Evaluation Study Area (estimated at €213 million).
Significance of the Cumulative Impact: Imperceptible (positive)
Rationale for Cumulative Impact Evaluation: • the Low sensitivity of the local economy • the Low magnitude of the effect -the additional GVA generated (€7.35 million to €11.35 million), is equivalent to approximately 4% to 5% of the overall size of the local economy in the UWF Grid Connection Cumulative Evaluation Study Area, in the year of construction. • Temporary duration of the construction stage.
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: • c.8 persons working directly on the project during construction • c.€100,000 in landowner payments • c.€500,000 induced expenditure on locally sourced goods and services
Significance of the Impact: Neutral (positive)
Rationale for Impact Evaluation: • the additional GVA generated, €600,000, is equivalent to approximately 2% per cent of the GVA of the EDs of Foilnaman, Upperchurch and Gortakelly, and • Temporary duration of the construction stage.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 6.2.2.2.1*
Element 4: Consented Upperchurch Windfarm
Impact Magnitude: • c.100 persons working directly on the project, most of them on-site, over the course of the construction phase • c.€120,000 to local landowners in the form of annual option payments and wayleave agreements. • c.€1.7 million to be spent regionally on Stone & Concrete from Rear Cross Quarry (Holycross) and Roadstone (Bunratty). • c.€500,000 induced expenditure on locally sourced goods and services
Significance of the Impact: Slight (positive)
Rationale for Impact Evaluation: • the value of the EDs of Foilnaman, Upperchurch and Gortakelly is €31.4m, the population of these EDs was 1,176 in 2016, • the additional GVA generated, €2.3 million, is equivalent to approximately 7% per cent of the overall size of the Local Economy, in the year of construction, • Temporary duration of the construction stage
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 6.2.2.2.1*

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Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Potential Bunkimalta Windfarm

Impact Magnitude: the potential Bunkimalta Windfarm (34MW), possibly comprises 16 turbines, a substation, and an already consented grid connection.

- It is estimated, based on employment levels for the Upperchurch project, that c.130 people will be employed during the construction phase
- It is estimated, based on the Upperchurch Project that c.€2 million could be spend locally on stone & concrete, if sourced locally.
- It is estimated, based on induced spending for the Upperchurch Project, that there will be c.€750,000 of induced expenditure on locally sourced goods and services

Significance of the Impact: Slight (positive)

Rationale for Impact Evaluation:

- the value of the Local Economy (Kilnarath, Abington and Greenall/Lackagh EDs) is €34.6m, the population of these EDs was 1,297 in 2016,
- the additional local GVA generated, €2.75 million, is equivalent to approximately 8% per cent of the Local Economy in the year of construction,
- Temporary duration of the construction stage.

Other Project: Consented Castlewaller Windfarm (and potential grid connection)

Impact Magnitude: Castlewaller Windfarm if constructed, will consist of 16 turbines and one substation and a potential underground grid connection mainly along public roads. This windfarm would be of a similar size to Bunkimalta Windfarm so the Bunkimalta Windfarm magnitude values above are applied to Castlewaller Windfarm.

- c.130 people will be employed during the construction phase
- c.€2 million could be spend locally on stone & concrete, if sourced locally.
- c.€750,000 of induced expenditure on locally sourced goods and services

Significance of the Impact: Slight (positive)

Rationale for Impact Evaluation:

- the value of the Local Economy (Kilnarath ED) is €8.8m, the population of this ED was 330 in 2016,
- the additional local GVA generated, €2.75 million, is equivalent to approximately 8% per cent of the Local Economy in the year of construction,
- Temporary duration of the construction stage.

Evaluation of Other Cumulative Impacts – Gross Value Added to Business & Employment Opportunities

Whole UWF Project Effect

Cumulative Impact Magnitude:

- c.200 persons working directly on the project, most of them on-site, over the course of the construction phase
- c.€1.15 million to local landowners in the form of wayleave agreements, option payments and land purchases.
- c.€3.2 million to be spent regionally on Stone & Concrete from Rear Cross Quarry (Holycross) and Roadstone (Bunratty).
- c.€1.5 million induced expenditure on locally sourced goods and services.

In total, the cumulative Gross Value Added (€5.85 million) of the Whole UWF Project construction, is expected to be approximately 1% of the value of the local economy of the Whole Project Cumulative Evaluation Study Area (estimated at €409 million).

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Significance of the Cumulative Impact: Neutral (positive)

Rationale for Impact Evaluation:

- the cumulative GVA generated, €5.85 million, will be equivalent to approximately 1% per cent of the overall size of the Local Economy in the Whole Project Cumulative Evaluation Study Area, in the year of construction,
- Temporary duration of the construction stage,

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

Cumulative Impact Magnitude: Both Upperchurch, Castlewaller and Bunkimalta Windfarms potentially could be constructed at the same time. All these windfarms are of similar scale. Cumulative local impacts include:

- c.460 persons (200 Whole UWF Project, 130 Bunkimalta Windfarm, 130 Castlewaller Windfarm) working directly on the projects, most of them on-site, over the course of the construction phase
- €1.6 million to local landowners in the form of wayleave agreements, option payments and land purchases.
- Between c.€3.2 million (Whole UWF Project) and €7.2 million (if Bunkimalta Windfarm and Castlewaller Windfarm sources stone regionally) to be spent regionally on Stone & Concrete from Rear Cross Quarry (Holycross) and Roadstone (Bunratty)
- C.€3 million induced expenditure on locally sourced goods and services

In total, the cumulative Gross Value Added for the 3 projects (€7.35 million to €11.35 million) being constructed during the same period, is expected to be approximately 2% to 3% of the value of the local economy of the UWF Grid Connection Cumulative Evaluation Study Area (estimated at €409 million).

Significance of the Cumulative Impact: Imperceptible (positive)

Rationale for Cumulative Impact Evaluation:

- the cumulative additional local GVA generated, of between c.€7.35 and €11.35 million, will be equivalent to 1% to 2% of the overall size of the Local Economy in the Whole Project Cumulative Evaluation Study Area, in the year of construction,
- Temporary duration of the construction stage.

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6.2.4.2 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 6-7 below.

Table 6-7: Description and Rationale for Excluded Impacts to Local Economy

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

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Traffic Management Measures Increased Traffic Volumes	1, 2, 4	Roads	Business disruption	Rationale for Excluding: Based on the evaluations in Chapter 15: Material Assets - Roads, it is considered that any business disruption caused by interrupted/disrupted access will have a neutral effect on the local economy. Chapter 15: Material Assets - Roads assesses the impact of construction works i.e. traffic management works on increased journey times and interruption or disruption of access to property. Chapter 15 concludes that in the case of journey times, the effect of the Whole UWF Project construction works will be negative and ranging from imperceptible to slight due to the temporary duration of the works, the implementation of traffic management, the use of 'stop/go' systems and flagmen, and the relatively lightly trafficked nature of the roads upon which the works will take place.
Construction activities	1, 2, 4	Air, Visibility	Reduction in tourism revenue	Rationale for Excluding: Based on the evaluations in Chapter 12: Air and Chapter 17: Landscape, it is considered that any increased dust and noise levels or a reduction in rural tranquillity during construction works will have a neutral effect on tourism revenue or the local economy. Chapter 12: Air (Air Quality) assesses the effects of dust soiling on Transient People (tourists). In this Chapter it is determined that at the construction stage there will be a Neutral impact, due to a Low receptor sensitivity, a Low sensitivity of the area (of walking routes, public roads or agricultural/forestry lands), combined with the medium magnitude of construction activities, it is considered that the risk of dust effects to Transient People is Low, furthermore the duration of any effects will be momentary to brief in duration. In addition Chapter 12: Air (Noise) assesses the impact of increases in ambient noise levels on transient people. At the construction stage it is found that the effect will be Neutral, as per the IEMA 2014 transient people are considered to have a Low sensitivity to noise effect, any walkers or cyclists will only momentarily encounter construction works at four locations where waymarked trails come into close proximity with construction works areas. In

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				addition, there will be no unauthorized access by transient people to construction works areas. Chapter 17: Landscape deals with the impact of the construction phase of UWF Grid Connection and the Whole UWF Project in causing a reduction in rural tranquillity. It is found that the negative impact will be of imperceptible significance due to the modest scale and extent of construction activities and the temporary and short-term duration of construction activity and reversibility of effects.
Operational Stage				
Contracts Purchase of Materials and services, Landowner agreements	1, 2, 4	Financial Transactions	Gross Value Added to Businesses & Employment Opportunities	Rationale for Excluding: The financial transactions (positive) during the operational stage of the UWF Grid Connection and of the Whole UWF Project will be low, representing less than 1 per cent of the local economy of the study areas on an annual basis. As such the operational phase will have a neutral effect on the local economy.
Operating turbines Operating substations Operating telecoms relay pole	1,2,4	Air, Visibility	Reduction in tourism revenue	Rationale for Excluding: Based on the evaluations in Chapter 12: Air and Chapter 17: Landscape, it is considered that any reduction in air quality due to maintenance activities or an increase in ambient noise or vibration levels or a reduction in rural tranquillity due to the operational turbines during the operational stage will have a neutral effect on tourism revenue or the local economy. As per Chapter 12: Air (Air Quality), all parts of the operational stage of the Whole UWF Project has been scoped out due to the fact that air quality impacts resulting from maintenance vehicle emissions will be very minimal and will have a Neutral impact on the air quality. As per Chapter 12: Air (Noise and Vibration) the effect of an increase in ambient noise levels from either the operational Mountphilips Substation or the Consented UWF Substation will not be audible at a distance beyond 200m. As there are no waymarked trails within this distance, there is no potential for impacts to Transient People (tourists). The Eamonn a Chnoic Loop is routed in close proximity to turbines in Knocknamena, however it is considered that while the noise emitted by the turbines will be heard in close proximity, this noise will not be intrusive – the levels will not cause any change in behaviour, such as having to speak more loudly as a conversation can be carried out normally while standing underneath a turbine. In the context of the momentary/brief duration of any effects, it is considered that the noise emitted by the Consented Upperchurch Turbines will have a neutral effect on any walkers that may be on this looped walk. In relation to vibration; emissions from operational plant/vehicles using site access

Local Economy

Sensitive Aspect

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				roads will be almost impossible to detect and therefore there will be no potential for impacts. Chapter 17: Landscape deals with the impact of the operational phase of UWF Grid Connection, either alone or cumulatively, in causing a reduction in rural tranquillity. These impacts are found to be negative but of imperceptible significance due to the very limited visible expression of UWF Grid Connection, UWF Related Works and UWF Replacement Forestry. In relation to the Upperchurch Windfarm, as per the ABP Inspectors Report (2014, Section 2), "In overall terms the principle of locating windfarm development in the area which is the subject of this appeal is reasonable" In addition, research by Fáilte Ireland[15] in 2012 found that 48 per cent of tourists to Ireland declared that viewing a wind farm did not impact on their sightseeing and a further 32 per cent reported the viewing of a windfarm to have a positive impact on sightseeing. In the same report, when asked what impact the likelihood of further windfarms have on their decision to visit Ireland again 43 per cent said it would have no impact/it depends with a further 28 per cent saying it would have a positive impact.
Decommissioning Stage				
Rationale for Excluding: The UWF Grid Connection will not be decommissioned, therefore no impacts will occur. UWF Related Works & Upperchurch Windfarm: The financial transactions (positive) associated with the decommissioning of the these elements will be very low, representing substantially less than 1% of the total capital costs of the project and relates to substantially less than 1% of the local economy. No business disruption is likely given the temporary duration and very low traffic volumes which will be associated with decommissioning activities.				

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[15] http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/WindFarm-VAS-(FINAL)-(2).pdf?ext=.pdf

6.2.5 Mitigation Measures for Impacts to Local Economy

No additional mitigation measures are required as the topic authors conclude that **significant impacts are not likely to occur** to occur to the Local Economy as a consequence of the UWF Grid Connection.

6.2.6 Evaluation of Residual Impacts to Local Economy

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures were required, and thus the Residual Impact is the same as the Impact set out in the Impact Evaluation Table above (Section 6.2.4.1) – i.e. **positive impacts.**

6.2.7 Application of Best Practice and the EMP for Local Economy

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

GC-BPM-09	Local Employment and Local Sourcing

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

Local Economy

Sensitive Aspect

6.2.8 Summary of Impacts to Local Economy

A summary of the Impact to Local Economy is presented in Table 6-8.

Table 6-8: Summary of the impacts to Local Economy

Impact to Local Economy:	**Gross Value Added to Businesses & Employment Opportunities**
Evaluation Impact Table	*Section 6.2.4.1*
Project Life-Cycle Stage	Construction
UWF Grid Connection *direct/indirect impact*	**Neutral (positive)**
UWF Grid Connection *cumulative impact*	**Imperceptible (positive)**
Element 2: UWF Related Works	Neutral (positive)
Element 3: UWF Replacement Forestry	Neutral Impact - Evaluated as Excluded, see Section 6.2.2.2.1
Element 4: Upperchurch Windfarm	Slight (positive)
Element 5: UWF Other Activities	Neutral Impact - Evaluated as Excluded, see Section 6.2.2.2.1
Cumulative Impact:	
Whole UWF Project Effect	**Neutral (positive)**
All Elements of the Whole UWF Project with Other Projects or Activities -Potential Bunkimalta Windfarm -Consented Castlewaller Windfarm (potential grid connection)	**Imperceptible (positive)**

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

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6.3 Reference List

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Reference List

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Population

UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 7: Human Health

RPS Group

October 2019

Topic Human Health

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Figure No.	**Figure Title**
Figure GC 7.1	Location of the UWF Grid Connection
Figures relevant for Human Health - Local Residents & Community	*Duplication of:* Chapters 6: Population - Local Economy: Figure GC 6.2, Figure CE 6.2, Figure WP 6.2 Chapter 11: Water - Local Wells & Springs: Figure GC 11.4, Figure CE 11.4, Figure WP 11.4 Chapter 12: Air - Local Residents & Community: Figure GC 12.2.1, GC 12.2.2, GC 12.2.3, Figure CE 12.2.1, CE 12.2.2 & CE 12.2.3, Figure WP 12.2.1, WP 12.2.2 & WP 12.2.3 Chapter 15: Material Assets (Roads) - Road Users: Figure GC 15.3, Figure CE 15.3, Figure WP 15.3
Figure relevant for Human Health - Transient People	*Duplication of:* Chapter 12: Air – Transient People: Figure GC 12.3, Figure CE 12.3, Figure WP 12.3 Chapter 15: Material Assets (Roads) - Road Users: Figure GC 15.3, Figure CE 15.3, Figure WP 12.3

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

List of Appendices

Appendix No.	**Appendix Title**
There are no appendices associated with this topic chapter.	

Glossary of Terms

Term	Definition
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.

List of Abbreviations

Abbreviation	Full Term
AA	Appropriate Assessment
COMEAP	Committee on the Medical Effects of Air Pollutants
CSO	Central Statistics Office
dB	Decibel
DECC	Department for Energy and Climate Change
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Electro-magnetic Fields
EPA	Environmental Protection Agency
EU	European Union
HDPE	High-density polyethylene
IAQM	Institute of Air Quality Management
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IFA	Irish Farmers' Association
IPH	Institute of Public Health in Ireland
PD	Ecopower Project Design Environmental Protection Measure developed by members of the EIAR Team
PM	Particulate Matter
WHO	World Health Organisation
UGC	Underground Cables
UWF	Upperchurch Windfarm

Executive Summary of the Human Health Chapter

Baseline Environment: The environment in which people live, work and use recreationally is characterised by good air quality with very low background concentrations of air pollutants; normal rural and road traffic background noise levels; two high voltage (110kV and 220kV) overhead lines in the vicinity of Coole/Mountphilips; the area is generally serviced by overhead electricity lines and overhead telephone lines and many residents and community facilities have access to public water supply, particularly in the Newport area, in Rear Cross and along the R503; and the roads in general are lightly trafficked.

Survey Results for Local Residents & Community and Transient People in the Baseline Environment: There are 391 No. local residences and 19 No. public & community facilities within 350m of construction works. Also, 301 No. of the local residents and 33 No. of the public & community facilities are located within 50m of construction material haul routes. In relation to the potential for electromagnetic field related effects, there are no residents or community facilities within 100m of Mountphilips Substation and 317 No. local residences and 17 No. public & community facilities (2 of which are schools) within 100m of the 110kV UGC along the public road.

The surrounding area is comprised of agricultural land and countryside, with a number of minor roads and waymarked trails where transient people may be present either travelling, recreationally, or working on the land. The Slievefelim Way and Ormond Way (cycle) are routed through the UWF Grid Connection study area.

Results from other Topic Chapters: The authors examined other topic chapter results in order to evaluate likely cross-factor effects to Human Health. Likely effects examined in Chapter 6: Population (Local Economy); Chapter 11: Water (water quality); Chapter 12: Air (construction dust and noise, operational noise and EMF); and Chapter 15: Material Assets (road users) and Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report were examined, and it was evaluated by the Human Health topic authors that, with the exception of local economy cross-factor effects, that any cross factor effects to the health of Local Residents & Community or of Transient People will be Neutral.

Summary of the Likely Impact on Local Residents & Community: The only likely impact is Increased Employment which represents a positive effect on Human Health of Local Residents & Community. The impact is evaluated as **Slight (Positive)** because 100 people will work on the construction of UWF Grid Connection and while the employment is temporary, it still represent a minor positive effect on health from direct income and employment, with indirect and diffuse benefits at the regional and local level. **Summary of the Likely Cumulative Impact:** The UWF Grid Connection will be constructed during the same period as Upperchurch Windfarm and the Other Elements, this will lead to greater benefits to the local economy with resultant greater positive impacts on Human Health. The cumulative impact is also evaluated as **Slight (Positive).** Should the *potential* Bunkimalta Windfarm and Castlewaller Windfarm be also built during the same period then these projects will also contribute to positive health effects, although the overall significance will remain the same due to the larger study area involved**.**

Summary of the Likely Impact on Transient People: Neutral health impacts during construction works primarily due to the brief to momentary duration of any impacts, and the transient and temporary nature of the works, being carried out during daylight hours. Operational effects will also be neutral due to the transitionary nature of this sensitive aspect and the increase in levels of EMF remaining substantially below the internationally agreed threshold levels.

Conclusion: The UWF Grid Connection will not cause significant adverse effects to Human Health.

Topic **Human Health**

7 Environmental Factor: Human Health

7.1 Introduction to the Human Health Chapter

7.1.1 What is Human Health?

The World Health Organisation (WHO) defines health as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity'. Health is determined not only by access to quality healthcare services and lifestyle choices but also by the social and economic conditions in which people live (IPH, 2009).

7.1.2 Overview of Human Health in the Local Environment

The UWF Grid Connection is located in the Mid-West region within North Tipperary. North Tipperary performs marginally worse than the national average for the majority of health status indicators. However, mental health indicators such as "deliberate self-harm", those diagnosed with a "psychological or emotional condition", and "deaths from respiratory disease" all perform better in North Tipperary compared to the national average.

The location of the UWF Grid Connection is illustrated on OSI Mapping on Figure GC 7.1: Location of the UWF Grid Connection.

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

7.1.3 Sensitive Aspects of the Human Health Environment included for further evaluation

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

Sensitive Aspect No. 1	Local Residents & Community *(such as schools)*	Section 7.2
Sensitive Aspect No. 2	Transient People (walkers, road users, farm workers etc)	Section 7.3

Each of the above listed Sensitive Aspects are evaluated individually in Sections 7.2 to 7.3 of this Chapter.

To help readers navigate to individual sensitive aspect sections, the colour codes for each Sensitive Aspect used above are also used in the Sensitive Aspect sections Section 7.2 to 7.3. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

7.1.4 Sensitive Aspects excluded from further evaluation

No Sensitive Aspects **are excluded from this topic chapter**.

7.1.5 Overview of the Subject Development

The UWF Grid Connection is the subject development, being the subject of a current application to An Bord Pleanála. The main parts of the UWF Grid Connection are identified in Table 7-1 below.

Table 7-1: 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 EIAR Main Report).

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

7.1.5.1 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.

7.1.6 The Authors of the Human Health Chapter

The RPS Health and Social Impact Assessments (HIA) team is a market leader for robust planning focussed HIA services, with an unrivalled catalogue of major HIA examples, and an unmatched level of proven HIA expertise and experience.

This report was written by Dr Andrew Buroni (PhD, MSc, BSc (Hons)), Fellow of the Royal Society of Medicine, Fellow of the Royal Society of Public Health), who has over 20 years of experience as a Health and Social Impact Assessment practitioner within the energy, oil and gas, waste management, transport, civil aviation, spatial planning, regeneration and sustainable development sectors.

Tara Barratt (MSc, DIC, BSc (Hons), AIEMA) assisted in the composition of this report. Tara has a Master of Science in Environmental Technology with a focus in environmental epidemiology, following a Bachelor of Science in Geography. Tara has a range of HIA experience which includes windfarms and their grid connections and major transport infrastructure projects.

7.1.7 Sources of Baseline Information

The information sources outlined in Table 7-2 were reviewed during desktop studies and confirmed during fieldwork in order to gather information on the baseline environment. The recommendations in the guidelines listed in the table, have been considered during the preparation of this chapter.

Table 7-2: Sources of Baseline Information for Human Health

Type	Source
Consultation	Feedback was received from • Health Services Executive • Members of the public during the Public Consultation and Information Day See Chapter 3: The Scoping Consultations, and Chapter 3 Appendices for further details.
Guidelines	• Institute of Public Health in Ireland (2009). Health Impact assessment Guidance (http://publichealth.ie/files/file/IPH%20HIA.pdf) • EPA Ireland (2017). Guidelines on the information to be contained in Environmental Impact Assessment Reports (https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf) • European Commission (2017). Guidance on the preparation of the Environmental Impact Assessment Report (http://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf) • DECC, "Power Lines: Demonstrating compliance with EMF public exposure guidelines. A voluntary Code of Practice," Department of Energy and Climate Change, 2012 (UK) • The Committee on Medical Effects for Air Pollution (COMEAP) quantitative exposure response functions for changes in air quality • International Commission on Non-ionizing Radiation Protection., "ICNIRP guidelines for Limiting Exposure to Time Varying Electric and Magnetic Fields (1 Hz 0 100 kHz)," Health Physics, vol. 99, no. 6, pp. 818-836, 2010 • EirGrid (2014) Study 1: EMF Literature review of electromagnetic fields (EMF) and human health, and an evidence base of EMF measurements from the Irish Transmission System
Desktop	• Available Census of Population data published by the CSO • Committee on Medical Effects for Air Pollution (COMEAP) • EirGrid (2014) Study 1: EMF Literature review of electromagnetic fields (EMF) and human health, and an evidence base of EMF measurements from the Irish Transmission System • Public health and hospital admissions data from the Public Health Well • EIAR Chapter 6: Population, Chapter 11: Water, Chapter 12: Air, Chapter 14: Material Assets (Built Services), Chapter 15: Material Assets (Roads), Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report. • Review of planning/ environmental information documents for the Other Elements of the Whole UWF Project as contained in Volume F of the planning application.

7.1.8 Methodology for Evaluating Effects

The Human Health section follows the approach recommended by the Institute of Public Health in Ireland (IPH, 2009). Such an approach provides the flexibility to investigate, remove and address potential environmental health issues, while also providing a framework to explore wider determinants of health and community requirements important to good health and wellbeing.

The Human Health section draws from and builds upon the wider EIA technical disciplines, most notably Chapter 6: Population, Chapter 11: Water (in particular Local Wells & Springs), Chapter 12: Air (air quality, noise, vibration, and electromagnetic fields), Chapter 14: Material Assets (Built Services, Chapter 15: Material Assets (Roads), Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report.

7.1.9 Certainty and Sufficiency of the Evaluation/Information

As per the EPA guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017), the Human Health chapter investigates and assesses the likelihood of significant effects directly attributable to what is proposed, and sets out analysis used to form the conclusions. In respect of Human Health no significant limitations or difficulties were encountered.

7.2 Sensitive Aspect No.1: Local Residents & Community

This Section provides a description and evaluation of the Sensitive Aspect - Local Residents & Community.

The Human Health section draws from and builds upon the wider EIA technical disciplines, most notably Chapter 6: Population, Chapter 11: Water (in particular Local Wells & Springs), Chapter 12: Air (air quality, noise, vibration, and electromagnetic fields) Chapter 14: Material Assets (Built Services), Chapter 15: Material Assets (Roads), Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report. The authors of this Human Health topic chapters used the results of the evaluations in the other topic chapters and appendices in order to evaluate any cross-factor effects to health.

7.2.1 BASELINE CHARACTERISTICS of Local Residents & Community

7.2.1.1 STUDY AREA for Local Residents & Community

The study area for Local Residents & Community in relation to the UWF Grid Connection is described in Table 7-3 and illustrated on the Figures and Mapping associated with Chapter 6: Population (Figure GC 6.2), Chapter 11: Water (Figure GC 11.4); Chapter 12: Air (Figures GC 12.2.1, GC 12.2.2, GC 12.2.3); Chapter 14: Material Assets (Built Services) (Figures GC 14.2) and Chapter 15: Material Assets (Roads) (Figure GC 15.3), these figures have been reproduced for the Human Health figures and are included in Volume C3 EIAR Figures.

Table 7-3: UWF Grid Connection Study Area for Local Residents & Community

Study Area for Local Residents & Community	Justification for the Study Area Extents
In order to evaluate cross-factor effects, the same geographical boundaries were used for Human Health as those used for Chapter 6: Population (Local Economy), Chapter 11: Water (Local Wells & Springs), Chapter 12: Air (Local Residents & Community), Chapter 14: Material Assets – Built Services (Local Residents & Community) and Chapter 15: Material Assets - Roads (Road Users).	The justification for the geographic boundaries is consistent with Chapter 6: Population (Local Economy), Chapter 11: Water (Local Wells & Springs), Chapter 12: Air (Local Residents & Community), Chapter 14: Material Assets – Built Services (Local Residents & Community) and Chapter 15: Material Assets - Roads (Road Users), thereby enabling the Human Health section to appraise the potential change in environmental and socio-economic determinants of health.

7.2.1.2 Baseline Context and Character of Local Residents & Community in the UWF Grid Connection Study Area

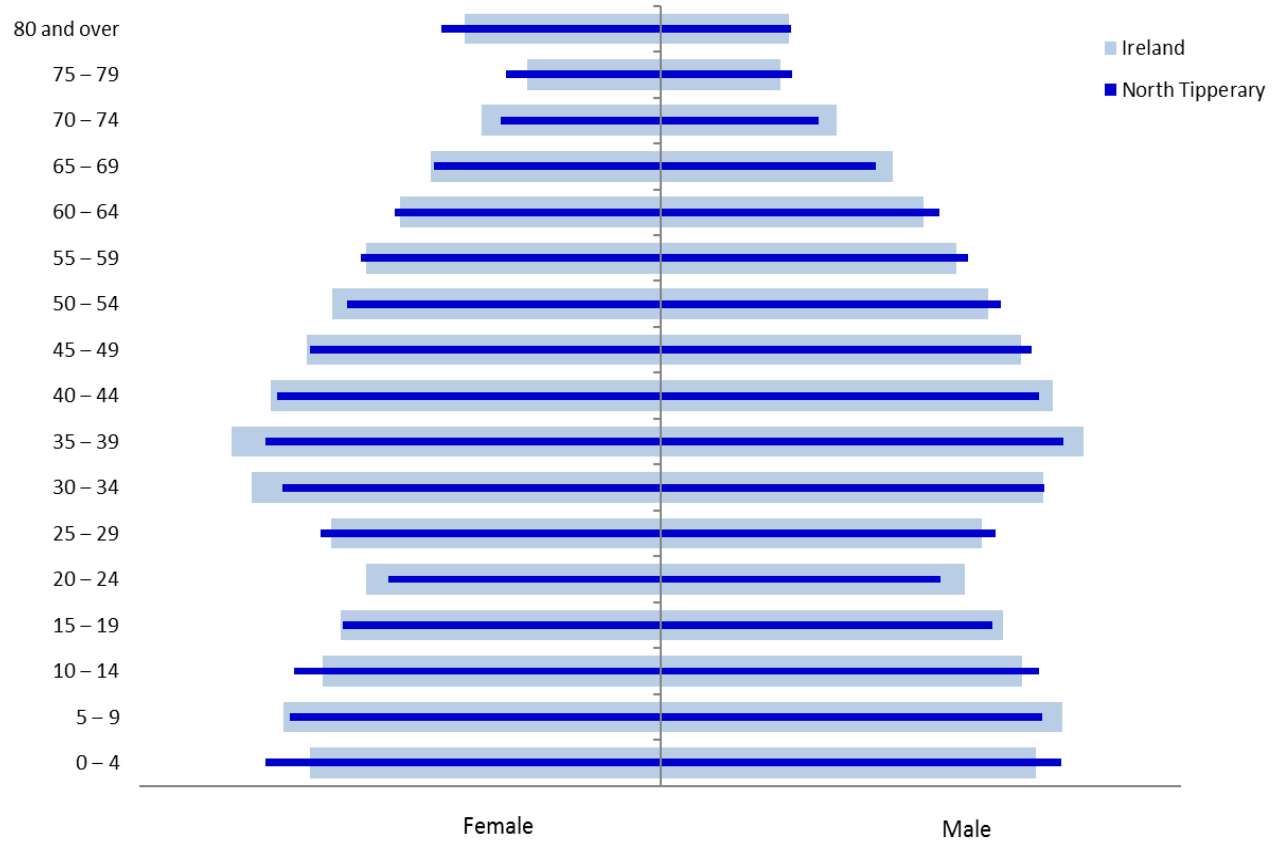
The UWF Grid Connection is located within North Tipperary, the area surrounding area the UWF Grid Connection is sparsely populated due to its rural nature.

Mountphilips Substation is located off a local road to the north of Newport town, while the 110kV UGC is routed along the public roads around Newport, then along the R503 through Rear Cross village to Knockmaroe and then along local roads to the Consented Upperchurch Windfarm Substation. The population structure within North Tipperary is displayed in Graph 7-1.

Local Residents & Community

Sensitive Aspect

Graph 7-1: Population Structure of North Tipperary Compared to Ireland, Source: (CSO, 2016)



As shown in Graph 7-1, local residents and communities in North Tipperary are generally of a similar demographic to the national average. The most significant differences can be seen in the youngest and oldest age categories where there is a higher proportion of those aged 0-4, 10-14, and 75-80+ in North Tipperary compared to the national average.

Physical, mental and social health status of the population in North Tipperary, in which the UWF Grid Connection is located, is summarised and compared to the national average in Table 7-4. The table also includes data for South Tipperary and County Limerick to reflect the study area for Population (Local Economy). Cells highlighted in green indicate a better health status than the national average, while red highlighted cells represent a worse health status compared to the national average.

Table 7-4: North Tipperary Health Baseline Compared to the Ireland Average

Human Health

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Indicator	North Tipperary	County Limerick	South Tipperary	Ireland Average
Limiting Long-Term Illness (2011)				
Total persons with a disability	13.7%	12.6%	14.7%	13.0%
Condition that limits basic physical activities	43.8%	42.2%	44.2%	41.1%
Mental Health				
Psychological or emotional condition (2011)	14.6%	15.1%	15.6%	16.1%
Suicide per 100,000 (2007-2013)	12.8	11.6	14.5	11.3
Deliberate self-harm per 100,000 (2012)	417.8	314.7	401.1	423.1
5 Year Standardised Mortality Rates				

Indicator	North Tipperary	County Limerick	South Tipperary	Ireland Average
All deaths – all ages	669.7	643.1	536.1	563.6
Deaths heart disease and stroke – all ages (2008-2012)	252.6	215.5	180.4	182.8
Deaths cancer – all ages (2008-2012)	204.6	188.6	166.9	175.6
Deaths respiratory disease – all ages (2008-2012)	57.4	81.6	51.8	64.9

Sources: (IPH, n.d.) (Lenus, 2015)

As shown in Table 7-4, North Tipperary performs marginally worse than the national average for the majority of health status indicators. However, mortality from respiratory disease and mental health indicators such as deliberate self-harm and those diagnosed with a psychological or emotional condition are lower in North Tipperary compared to the national average. Overall, the most noticeable health status disparities in the study area compared to the national average are the higher mortality rates for all-causes, cardiovascular disease, and cancer.

Local environmental and socio-economic context:

As described in Chapters 6: Population, with the exception of the Newport area, the upland area around the 110kV UGC is sparsely populated, comprising one off houses and farmsteads and small villages. The nearest villages are Rear Cross and Kilcommon. Local residents and community facilities in the area are concentrated in Newport town and Rear Cross village. Two local primary schools – Lackamore National School and Rear Cross National School, are located along the route of the 110kV UGC on the Regional Thurles to Limerick Road R503.

As described in Chapters 12: Air, there is a good air quality with very low background concentrations of air pollutants. The area around Mountphilips Substation is an area of low background noise, while the area along public road networks is considered to have normal background noise levels. There are two high voltage (110kV and 220kV) overhead lines in the vicinity of Coole/Mountphilips.

In relation to potential air quality and noise related effects, there are 391 no. local residents and 19 no. community facilities within 350m of construction works.

Construction material haulage will also occur on these roads, and 301 no. of the local residents and 33 no. of the community facilities are located within 50m of construction material haul routes.

In relation to the potential for electromagnetic field related effects, there are 317 no. local residents, 17 no. community facilities (2 of which are schools) within 100m of the 110kV UGC. The distance of the UWF Grid Connection from these 2 local schools is 16m from Lackamore National School and 62m from Rear Cross National School.

As described in Chapter 11: Water, it is likely that local residents and community facilities in Newport and Rear Cross are on the public water supply network. While it is also likely that the majority of houses in close proximity to the 110kV UGC route are supplied via public water supply pipelines, there may be some wells which are close to construction works areas.

As described in Chapters 14: Material Assets (Built Services), local residents are generally serviced by overhead electricity lines and overhead telephone lines. Underground water supply also occurs along some roads in the area.

As described in Chapter 15: Material Assets (Roads), Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report, roads in the UWF Grid Connection study area

primarily comprise local roads with one regional road (R503). These roads are lightly trafficked at present. Traffic speeds on roads are generally below the posted speed limit. As per Chapter 15 Material Assets (Roads), a review of the Road Safety Authority (RSA) online collision database shows that 2 no. serious collisions and 3 no. minor collisions were recorded along the route of the 110kV UGC on the R503 between 2005-2015 inclusive. No collisions were recorded on the local roads within the study area during this period.

7.2.1.3 Importance of Local Residents & Community

In the absence of good physical, mental and social health and wellbeing, individuals and communities become limited in achieving their full potential. Therefore, achieving and maintaining good health and wellbeing through prevention techniques rather than treatment is of utmost importance. In addition to the clear benefits of good health on an individual and community scale, healthy lifestyles and behaviours contribute to relieving any unnecessary burden on healthcare services across Ireland to maintain good quality, access, value, standards of care and patient outcomes.

7.2.1.4 Sensitivity of Local Residents & Community

Individuals are considered more sensitive if there is an existing burden of poor health within an area, or there is a dominantly older or younger demographic. The age structure presented in Graph 7-1 is generally very similar to the national average but shows the most significant differences in the youngest and oldest age categories, where there is a higher proportion of those aged 0-4, 10-14, and 75-80+ in North Tipperary compared to the national average. In addition, the health baseline presented in Table 7-4 shows a higher existing burden of poor health in comparison to the national average. Overall, this suggests that the community surrounding the UWF Grid Connection are marginally more sensitive to changes to environmental and socio-economic health pathways than the average population in Ireland, potentially resulting in disproportionate health effects. This spatial sensitivity has been taken into account within the health assessment.

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

In terms of population in the area, data from the past 10 years of Censuses suggests that population growth peaked in the decade to 2016, with a notable slowdown in population growth in the last five years recorded in Census 2016. Within the study area, Newport town has experienced rapid population growth, doubling in population between 1996 and 2016.

In relation to local wells and springs, no trends are known in respect of water quality or quantity of the sources identified. Similarly no trends or plans are known for public water supplies.

Air quality, noise and EMF are expected to remain largely the same, however noise could increase in the Upperchurch area should the Upperchurch Windfarm be built.

Very slow increases in annual traffic volumes on the local and regional roads in the study area, are expected, in the region of 1-2% per annum.

7.2.1.6 Receiving Environment (the Baseline + Trends)

The trends identified will not significantly change by the time the construction or operation phases commence. Therefore, it is assumed that the baseline environment identified will be the receiving environment.

7.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

7.2.2.1 UWF Grid Connection Cumulative Evaluation Study Area

7.2.2.1.1 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 Grid Connection Cumulative Evaluation Study Area for Local Residents & Community	Justification for the Study Area Extents
In order to evaluate cross-factor cumulative effects, the same geographical boundaries were used for Human Health as those used for Chapter 6: Population (Local Economy), Chapter 11: Water (Local Wells & Springs), Chapter 12: Air (Local Residents & Community), Chapter 14: Material Assets – Built Services (Local Residents & Community) Chapter 15: Material Assets - Roads (Road Users).	The geographic boundaries are consistent with Chapter 6: Population (Local Economy), Chapter 11: Water (Local Wells & Springs), Chapter 12: Air (Local Residents & Community), Chapter 15: Material Assets - Roads (Road Users), thereby enabling the Human Health section to appraise the potential cumulative change in environmental and socio-economic determinants of health.

The study area is illustrated on Chapter 6: Population Figure CE 6.2, Chapter 11: Water Figure CE 11.4, Chapter 12: Air Figure CE 12.2.2.1 to CE 12.2.2.3, Chapter 14: Material Assets (Built Services) Figure CE 14.2 and Chapter 15: Material Assets (Roads) Figure CE 15.3, these figures have been reproduced for the Human Health figures and are included in Volume C3 EIAR Figures.

7.2.2.1.2 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 7.2.2.2.1 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 7-5 and illustrated on Chapter 6: Population Figure WP 6.2, Chapter 11: Water Figure WP 11.4, Chapter 12: Air Figure WP 12.2.1 to Figure WP 12.2.3, Chapter 14: Material Assets (Built Services) Figure WP 14.2 and Chapter 15: Material Assets (Roads) Figure WP 15.3, these figures have been reproduced for the Human Health figures and are included in Volume C3 EIAR Figures.

Table 7-5: Whole Project Cumulative Evaluation Study Area for Local Residents & Community

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	In order to evaluate cross-factor cumulative effects, the same geographical boundaries were used for Human Health as those	The geographic boundaries are consistent with Chapter 6: Population (Local Economy), Chapter 11: Water (Local Wells & Springs), Chapter 12: Air
Element 2: UWF Related Works		

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Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 3: UWF Replacement Forestry	used for Chapter 6: Population (Local Economy), Chapter 11: Water (Local Wells & Springs), Chapter 12: Air (Local Residents & Community), Chapter 14: Material Assets – Built Services (Local Residents & Community) and Chapter 15: Material Assets - Roads (Road Users).	(Local Residents & Community), and Chapter 15: Material Assets - Roads (Road Users) thereby enabling the Human Health section to appraise the potential cumulative change in environmental and socio-economic determinants of health.
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

7.2.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The Whole Project of cumulative impacts to Local Residents & Community also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Local Residents & Community with either the UWF 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 Cumulative Evaluations (Section A2.1 .4.2).

The results of this scoping exercise are that: the existing Shannonbridge – Killonan 220kV OHL, Bunkimalta Windfarm (potential windfarm and consented grid connection) and Castlewaller Windfarm (consented windfarm and potential grid connection) have been scoped in for evaluation of cumulative effects to Local Residents & Community.

7.2.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Local Residents & Community

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Local Residents & Community. The results of this evaluation are included in Table 7-6.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on the Figures and Mapping associated with Figure WP 6.2, Figure WP 11.4; Figure WP 12.2.1 to Figure WP 12.2.3, Figure WP 14.2 and Figure WP 15.3 all in Volume C3 EIAR Figures.

Table 7-6: 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	Evaluated as excluded: no potential to cause any adverse health impacts to Local Residents & Community, as there will be: • Neutral impacts to the local economy: as per Chapter 6: Population, Section 6.2.2.2.1, trees are likely to be sourced from Dundrum or further afield, which is located just outside the larger cumulative evaluation study area. At a local scale, the financial transactions (positive

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	impact) associated with the UWF Replacement Forestry will be relatively low. Capital expenditure will be greatest during the planting stage and will represent less than 1% of the Local Economy. On this basis, health impacts to local populations will be Neutral. • No impact to water quality in local wells & springs: as per Chapter 11: Water, Section 11.2.4, due to Project Design Measures any impacts to local surface water bodies will be no greater than Imperceptible, additionally no springs or wells were identified within 50m of the UWF Replacement Forestry (Chapter 11: Water, Section 11.4.2.2.1). On this basis, there is no potential for any impact on local water quality or water availability sufficient to impact upon local health. • No material adverse impact on air quality, noise or vibration: as per Chapter 12: Air, Section 12.2.2.2.1, planting of the new woodland will have Neutral impact on air quality as works will be carried out by hand using spades, with use of vehicles limited to personnel vehicles. No mechanical noise or vibration sources during planting stage, as planting will be carried out by hand in grassland fields, therefore no noise or vibration impact will occur. During the growth stage, chainsaws may be used during thinning activities, however this type of activity will be infrequent, brief in nature and at a distance from local residents. Potential community exposure to environmental health pathways are therefore not of a magnitude, timing or duration to quantify any adverse impacts to local community health during any planting activities or thinning activities. • No likely impacts to public water supply: as per Chapter 14: Material Assets (Built Services), Section 14.2.4, due to Project Design measures. On this basis there is no potential for any health impacts due to contaminated water or disruption of supply. • No EMF emissions: in relation to electromagnetic fields, there are no electrical or radio-communication parts associated with the UWF Replacement Forestry. Therefore, the UWF Replacement Forestry will not influence local EMF or result in any change in exposure, with no potential for impacts to health. • Neutral impact on traffic volumes: as per Chapter 15: Material Assets (Roads), Section 15.3.2.2.1, the planting programme will generate extremely low traffic volumes, with 1-2 vehicles movements per day over a one month period. As a comparative example this level of traffic is substantially less than the daily level of traffic generated by a single residential dwelling. During the growth stage, traffic will be in the region of 2 to 4 vehicle movements per year. Due to the extremely low traffic volumes associated with the UWF Replacement Forestry, it is considered that Neutral effects will occur to Road Users on the local roads in the vicinity, with Neutral impact on local health. • No decommissioning effects, as UWF Replacement Forestry will be permanent woodland.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: **no potential to cause any adverse health impacts** to **Local Residents & Community,** as there will be: • Neutral impacts to the local economy: as per Chapter 6: Population, Section 6.2.2.2.1, at a local scale, the financial transactions (positive impact) associated with the UWF Other Activities will be relatively low and will not cause any measurable effect to the local economy. Specifically in relation to the Haul Route Activities, no business disruption is likely given the location of these activities on the verges of regional and national roads, the small extent and momentary to temporary duration of the activities. On this basis, there is no material risk to health.

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	• Neutral impacts to water quality: as per Chapter 11: Water, Section 11.4.2.2.1, no likely effects to water quality as a result of Haul Route Activities, Overhead Line Activities or Monitoring Activities, only minor groundworks required for Upperchurch Hen Harrier Scheme, therefore any effects to water quality will be neutral. On this basis, health effects caused by contaminated water are not likely to occur. • Neutral impacts to Air: as per Chapter 12: Air, Section 12.2.2.2.1, any vehicle and equipment use will be of a short duration, transient in nature, and the relative change in concentration and community exposure will be orders of magnitude lower than is required to quantify any material impact on health. Any noise or vibration emitted by machinery or vehicles used to carry out the UWF Other Activities, will be in the context of background noise and vibration from regional or national roads, or will not be noticeable in the context of local traffic and farming activity. Equipment which will be used includes a hedge cutter and tractor and hand tools. Activities will take between 15 minutes and 2 days to complete at the various locations. Given that any change will be temporary and transient in nature, of a short duration and low magnitude with limited opportunity for community exposure, there is Neutral risk to health. In relation to electromagnetic fields, there are no electrical or radio-communication parts associated with the UWF Other Activities. On this basis, there is no potential for changes in exposure to EMF, and Neutral risk to health. • No likely impacts to public water supply: as per Chapter 14: Material Assets (Built Services), Section 14.2.2.2.1. • Neutral impacts to Road Users: as per Chapter 15: Roads & Road Users, Section 15.3.2.2.1, the traffic increases as a result of the Haul Route Activities (tree trimming, laying of matting, street furniture removal), will be in all cases considerably less than 1% of the current traffic volumes on these roads. Given that the normal day-to-day variation in traffic conditions can be as much as 10%, the relative change is not of a level to quantify any impact on local community health. In addition, no works to the road network or road boundaries form part of the Overhead Line Activities, or Upperchurch Hen Harrier Scheme or Monitoring Activities, and taking into consideration the extremely low volumes of traffic associated with these activities, and the brief duration of any public road use, no effects to Road Users are likely. • No decommissioning effects, as any activities consequent of Upperchurch Windfarm decommissioning will be minimal, brief and reversible.
Other Projects or Activities	
Shannonbridge – Killonan 220kV OHL Bunkimalta Windfarm Castlewaller Windfarm	The existing Shannonbridge – Killonan 220kV OHL is included for the evaluation of cumulative cross-factor effects from changes to EMF levels in the Air. The potential Bunkimalta Windfarm is included for the evaluation of cumulative cross-factor effects from changes to the local economy. The Castlewaller Windfarm is included for the evaluation of cumulative cross-factor effects from changes to the local economy. The potential Castlewaller Windfarm grid connection is included for the evaluation of cumulative cross-factor effects from changes to air quality, noise and damage to road pavements during construction, and for changes to EMF levels during the operational stage.

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7.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

The cumulative study area, in relation to Other Elements of the Whole UWF Project and Other Existing or Consented Projects, includes additional areas in North Tipperary, and also extends into South Tipperary and County Limerick to reflect the entire Slievefelim to Silvermine Upland Area for the evaluation of indirect Population effects. It is assumed in this chapter that the population structure of the Cumulative Evaluation Study is similar to that of North Tipperary, as shown in Graph 7-1.

The physical, mental and social health status of population in North Tipperary, South Tipperary and County Limerick is replicated in Table 7-7 below.

Table 7-7: South Tipperary and County Limerick Health Baseline

Indicator	North Tipperary	County Limerick	South Tipperary	Ireland Average
Limiting Long-Term Illness (2011)				
Total persons with a disability	13.7%	12.6%	14.7%	13.0%
Condition that limits basic physical activities	43.8%	42.2%	44.2%	41.1%
Mental Health				
Psychological or emotional condition (2011)	14.6%	15.1%	15.6%	16.1%
Suicide per 100,000 (2007-2013)	12.8	11.6	14.5	11.3
Deliberate self-harm per 100,000 (2012)	417.8	314.7	401.1	423.1
5 Year Standardised Mortality Rates				
All deaths – all ages	669.7	643.1	536.1	563.6
Deaths heart disease and stroke – all ages (2008-2012)	252.6	215.5	180.4	182.8
Deaths cancer – all ages (2008-2012)	204.6	188.6	166.9	175.6
Deaths respiratory disease – all ages (2008-2012)	57.4	81.6	51.8	64.9

Sources: (IPH, n.d.) (Lenus, 2015)

7.2.2.3.1 Element 2: UWF Related Works

UWF Related Works is located in the same area as the Consented Upperchurch Windfarm, the description of the below baseline environment is relevant.

7.2.2.3.2 Element 4: Consented Upperchurch Windfarm

Upperchurch Windfarm is a consented 22-turbine windfarm, which is located on a series of hills between the villages of Kilcommon and Upperchurch.

Local environmental and socio-economic context:

As described in Chapter 6: Population, the area around the Consented Upperchurch Windfarm is sparsely populated, comprising once off houses and farmsteads and the small villages of Upperchurch and Kilcommon.

As described in Chapter 12 Air, there is a good air quality with very low background concentrations of air pollutants. In relation to potential air quality and noise related effects, there are 29 no. local residences (no community facilities) within 350m of construction works areas, and 33 no. local residences within 50m of construction material haul routes on the local roads in the windfarm area. In relation to potential electromagnetic field related effects, there are no local residences or community facilities within 100m of Consented UWF Turbines or the Consented UWF Substation.

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As described in Chapter 11: Water, there are no wells or springs within 100m of construction works.

As described in Chapters 14: Material Assets Built Services, local residents are serviced by overhead electricity and telephone lines. Underground water supply also occurs along most roads in the area.

As described in Chapter 15: Material Assets Roads, roads in the Upperchurch Windfarm study area primarily comprise local roads with one regional road (R503). These roads are lightly trafficked at present.

Consideration of the Passage of Time: Human health was not explicitly evaluated in the 2013 and 2014 assessments for the consented Upperchurch Windfarm. However, this environmental factor is now considered in the evaluations in this EIAR for UWF Grid Connection, and a cumulative evaluation is carried out for Upperchurch Windfarm.

7.2.2.3.3 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 12.2.2.2.1

7.2.2.3.4 Other Projects or Activities

Shannonbridge – Killonan 220kV OHL: There is 1 No. local residence (no community facilities) within 100m of both the 110kV UGC (95m distance) and the existing 220kV OHL (53m distance). This residence is located in Coole townland on the L2166-0.

Bunkimalta Windfarm: potential 34MW windfarm, possibly comprising approximately 16 turbines and substation, with a consented underground grid connection mainly along roads to Nenagh town. The Bunkimalta Windfarm is located in the northern half of the Slievefelim to Silvermines Mountain upland area, and at a substantial separation distance to any of the Whole UWF Project Elements.

Castlewaller Windfarm: Is a consented 16 – turbine windfarm, located in the northern half of the Slievefelim to Silvermines Mountain upland area, the nearest turbine is 1.2km north of the 110kV UGC. A potential grid connection, is predominantly on public roads to Killonan Station outside Limerick City. Part of the potential underground grid connection route is along the L6009-0, just east of Newport Town (*along which a section of the UWF Grid Connection 110kV UGC is currently proposed*). A potential site entrance on the R503 (along the UWF Grid Connection route) was also included in the SID Pre-Application consultations for the potential grid connection. The Castlewaller Windfarm project is at a substantial separation distance to the other Whole UWF Project Elements.

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7.2.3 PROJECT DESIGN MEASURES for Local Residents & Community

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 are 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 7-8 are relevant to the Environmental Factor, Human Health, and in particular to the sensitive aspect **Local Residents & Community**.

Table 7-8: UWF Grid Connection Project Design Measures relevant to Local Residents & Community

PD ID	Project Design Environmental Protection Measure (PD)
PD04	All construction works will be carried out during daylight hours
PD06	Construction works will not be carried out within 150m of Rearcross National School or Lackamore National School, during school hours. In addition, the project Community Liaison Officer will keep each school informed of construction timetables and scheduling.
PD07	110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads.
PD08	Confirmatory consultations with Irish Water, Eir and ESB and review of all relevant infrastructure mapping before works, along with confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a banksman will accompany each excavator to oversee all excavation works.
PD09	Close contact with the local Newport Regional Supply office at Newross will be maintained by the Environmental Clerk of Works throughout the construction of the 110kV UGC. The Environmental Clerk of Works will keep the Newport Regional Water Supply office up-to-date with the location and schedule of works. To reduce risk of damaging water mains; pre-construction confirmatory surveys will be carried out, and excavations will be hand dug within 500mm of pipes. So that any damage (should it occur) can be fixed immediately, a supply of water mains repair materials will be kept at the Mountphilips Substation compound and at each works location on the public road network.
PD10	Flag-men will be used at 110kV UGC works locations on the public roads subject to one lane closures. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the public road network in a in a safe and efficient manner. The works will be carried out according to the Traffic Management Plan for UWF Grid Connection. The Traffic Management Plan forms part of the Environmental Management Plan.
PD11	Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m.
PD12	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.
PD13	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the Promoter will fund the costs of Tipperary County Council engaging a chartered

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	Civil Engineer to oversee quality control and compliance with drawings, specifications and road opening conditions for the duration of the works
PD16	No refuelling of plant or equipment will be permitted within 100m of identified water supply wells

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the design of the UWF 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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7.2.4 EVALUATION OF IMPACTS to Local Residents & Community

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 Residents & Community.

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

Table 7-9: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Increased employment which is a wider determinant of health (construction stage)	*Potential impact on health as a result of contamination of well water supplies (construction stage)*
	Potential impact on health as a result of contamination of public water supplies (construction stage)
	Potential impact upon cardiovascular and respiratory health from changes to air quality (construction stage)
	Potential impact upon mental health (from stress, annoyance and sleep disturbance) and as a consequence, impact on cardiovascular health associated with exposure to noise and vibration (construction stage)
	Increased risk of injury from road traffic accidents (construction stage)
	Increased employment which is a wider determinant of health (operational stage)
	Potential impact upon mental health (from stress, annoyance and sleep disturbance) and as a consequence, impact on cardiovascular health associated with exposure to noise and vibration (operational stage)
	Potential impact on health as a result of exposure to EMF (operational stage)
	Increased risk of injury from road traffic accidents (operational stage)
	Decommissioning Effects

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the next section. **The Impact Evaluation Table is presented in the following Section 7.2.4.1.**

The source-pathway-receptor links and the rationale for impacts excluded are described in the section directly after the Impact Evaluation Table section, in Section 7.2.4.2.

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7.2.4.1 Impact Evaluation Table: Increased Employment

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction contracts
Cumulative Impact Source: Construction contracts
Impact Pathway: Financial transactions

Impact Description: An increase in direct employment within the study area which is associated with individual financial welfare, and also results in indirect employment opportunities within the supply chain and induced spending in the local economy.

Impact Quality: **Positive**

Evaluation of the Subject Development Impact – Increased Employment

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
There will be approximately 100 people working directly on the UWF Grid Connection element of the project over the course of the construction phase.

Significance of the Impact: Slight Positive

Rationale for Impact Evaluation:

- Income and employment are key determinants of health. In this instance, the direct employment opportunities offered during the construction phase are temporary but still represent a minor positive effect on health from direct income and employment, with residual indirect and diffuse benefits at the regional and local level.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:
UWF Grid Connection is expected to be constructed at the same time as the other elements of the Whole UWF Project, in addition, although unlikely, Bunkimalta Windfarm and Castlewaller Windfarm could potentially be constructed at the same time as UWF Grid Connection. Cumulative local impacts include:

- approximately 100 people working directly on the UWF Grid Connection element of the project over the course of the construction phase
- approximately 100 people working directly on UWF Related Works and Upperchurch Windfarm over the course of the construction phase (there is no increase in employment numbers as UWF Related Works will be carried out by Upperchurch Windfarm construction crews) and
- approximately 130 people working directly on the Bunkimalta Windfarm project
- approximately 130 people working directly on the Castlewaller Windfarm project

Significance of the Cumulative Impact: Slight Positive

Rationale for Cumulative Impact Evaluation:

- Income and employment are key determinants of health. In this instance, the direct employment opportunities offered during the construction phase are temporary but still represent a minor positive effect on health at the individual level from direct income and employment, with residual indirect and diffuse benefits at the regional and local level.
- The temporary duration of the construction stage, in the context of the size of the local economy in the UWF Grid Connection Cumulative Evaluation Study Area.

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Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: There will be approximately 5 people working directly on the UWF Related Works element of the project over the course of the construction phase.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • Income and employment are key determinants of health. In this instance, the direct employment opportunities offered during the construction phase offer little cumulative contribution and are therefore considered imperceptible.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 7.2.2.2.1*
Element 4: Consented Upperchurch Windfarm
Impact Magnitude: There will be approximately 100 people working directly on the Upperchurch Windfarm element of the project over the course of the construction phase.
Significance of the Impact: Slight positive
Rationale for Impact Evaluation: • Income and employment are key determinants of health. In this instance, the direct employment opportunities offered during the construction phase are temporary but still represent a minor positive effect on health at the individual level from direct income and employment, with residual indirect and diffuse benefits at the regional and local level.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 7.2.2.2.1*
Cumulative Information: Individual Evaluations of Other Projects or Activities
Other Project: Potential Bunkimalta Windfarm
Impact Magnitude: the potential Bunkimalta Windfarm (34MW), possibly comprises 16 turbines, a substation, and an already consented grid connection. As per Chapter 6 Population: it is estimated that there will be approximately 130 people working directly on the Bunkimalta Windfarm project and over the course of its construction period.
Significance of the Impact: Slight positive
Rationale for Impact Evaluation: • Income and employment are key determinants of health. In this instance, the direct employment opportunities offered during the construction phase are temporary but still represent a minor positive effect on health at the individual level from direct income and employment, with residual indirect and diffuse benefits at the regional and local level.
Other Project: Castlewaller Windfarm (consented windfarm and potential grid connection)
Impact Magnitude: Castlewaller Windfarm if constructed, will consist of 16 turbines and one substation and a potential underground grid connection mainly along public roads. As per Chapter 6 Population: it is estimated that there will be approximately 130 people working directly on the Castlewaller Windfarm project and over the course of its construction period.
Significance of the Impact: Slight positive

Rationale for Impact Evaluation:

- Income and employment are key determinants of health. In this instance, the direct employment opportunities offered during the construction phase are temporary but still represent a minor positive effect on health at the individual level from direct income and employment, with residual indirect and diffuse benefits at the regional and local level.

Evaluation of Other Cumulative Impacts – Increased Employment

Whole UWF Project Effect

Magnitude:
Overall, there will be approximately 200 people working directly on the UWF Grid Connection and the UWF Related Works and the Upperchurch Windfarm over the course of the construction phase.

Significance of the Whole Project Effect: Slight Positive

Rationale for Impact Evaluation:

- Income and employment are key determinants of health. The cumulative direct employment opportunities offered during the construction phase are temporary but support job security; and represent a minor positive contribution effect on health at the individual level from direct income and employment, with residual indirect and diffuse benefits at the regional and local level.

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

Cumulative Impact Magnitude:
Overall, there will be approximately 460 people working directly on the Whole UWF Project, the Bunkimalta Windfarm project and the Castlewaller Windfarm project during their construction periods.

Significance of the Cumulative Impact: Imperceptible Positive

Rationale for Cumulative Impact Evaluation:

- The temporary duration of the construction stage, in the context of the larger Cumulative Evaluation Study Area.

7.2.4.2 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 7-10 below.

Table 7-10: Description and Rationale for Excluded Impacts to Local Residents & Community

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

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Contamination of water supply	1, 2, 4	Water	Potential impact on health as a result of contamination of well water supplies	Rationale for Excluding: No likely health impacts As stated in Chapter 11 (Water) there are small volumes of potential contamination sources on-site (fuels and oils). In addition, appropriate project design measures will be put in place during the construction phase and it was considered by the authors of Chapter 11 (Water) that effects to water supply are not likely to occur. As a result, health effects caused by contaminated water are also not likely to occur.
Contamination of water supply	1,2	Water	Potential impact on health as a result of contamination of public water supplies	Rationale for Excluding: No potential for health impacts. The vast majority of local residents, local community facilities, including local schools (UWF Grid Connection only), are serviced by water supply is via the piped Irish Water public supply, as stated in Chapter 14: Material Assets (Built Services - Water Supply) due to project design measures for UWF Grid Connection and UWF Related Works, there is no likelihood of any impacts to this water supply. It is expected that construction works for Castlewaller grid connection will be carried out to best practice and in compliance with a Road Opening License, adverse impacts to water supplies are unlikely to occur. As a result, health effects caused by contaminated water are also not likely to occur.
Air quality impacts from vehicle emissions and dust (PM_{10} and $PM_{2.5}$)	1, 2, 4	Air	Potential impact upon cardiovascular and respiratory health from changes in air quality	Rationale for Excluding: Neutral health impacts According to IAQM guidelines, the sensitivity of the surrounding area to human health impacts is Low and the majority of residential properties and community facilities are greater than 50m away from construction works or construction haul routes. In addition, background levels of pollutants are significantly below relevant EU limit values set for the protection of the environment and human health. As a result, any impact to air quality during the construction phase will be temporary, intermittent and not of a concentration or exposure to quantify any adverse health outcome to local residents or members of the community (including schools). In relation to cumulative impacts with Castlewaller Windfarm grid connection works on L6009-0 and site entrance works off R503, cumulative construction

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				impacts are not expected as works will either take place at separate times, or should works be carried out at the same time, then works on the grid connection for both projects are likely to be carried out by one crew, with no material cumulative increase in dust at local residents, and although a longer construction periods is possible on the local road L6009-0, this will not cause significant effects to residential amenity, as the works are still temporary and of short duration, during daylight hours. Works at the R503 entrance will not cause cumulative significant impacts to local residents due the very short duration of both 110kV UGC works and the entrance works.
Noise impacts from machinery	1, 2, 4	Air	Potential impact upon mental health (from stress, annoyance and sleep disturbance) and as a consequence, impact on cardiovascular health associated with exposure to noise and vibration	Rationale for Excluding: Neutral health impacts The nature of construction noise will be temporary and intermittent. Noise generated from construction activities (measured at the façade of dwellings) has potential to exceed the NRA threshold limits over a period of 1-2 days at a limited number of houses, the threshold limits will not be exceeded at other house locations, and any increases in noise will be temporary. Noise impacts will be mitigated through project design measures such as limiting working hours to daytime hours only (07:00-19:00hrs Monday to Friday and 08:00-16:30hrs on Saturday), along with the control of sequencing of works in the Knockmaroe/Knockcurraghbola to ensure only one Element is being constructed at any one time within 350m of a residence. Although not planned, any construction works that take place between 19:00 and 22:00 (Monday to Friday), 08:00 to 16:30 (Sunday and bank holidays), or at any other time, would require the explicit permission of the relevant local authority unless in an emergency and will be limited to 60 $LAeq_{(1\ hour)}$ dB. As a result, noise generated during the construction phase presents limited opportunity for any risk of annoyance or sleep disturbance, and when considered in the context of the very short duration of works within close proximity to any property it is considered that there will be Neutral health effects to local residents or community. In relation to local schools: Lackamore National School and Rear Cross National School are located 16m and 62m from the UWF Grid Connection, respectively. As per Section 12.2.4.2: these receptors are both located along the regional public road network, where the normal construction threshold of 70dB(A) applies. In addition, the UWF Grid Connection will not be constructed within 150m of Local Schools during school opening hours, therefore it is

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				considered that health effects to children and teachers at Local Schools will be neutral. In relation to cumulative impacts with Castlewaller Windfarm grid connection works on L6009-0 and site entrance works off R503, cumulative construction impacts are not expected as works will either take place at separate times, or should works be carried out at the same time, then works on the grid connection for both projects are likely to be carried out by one crew, with no material cumulative increase in noise at local residents, and although a longer construction periods is possible on the local road L6009-0, this will not cause significant effects to residential amenity, as the works are still temporary and of short duration, during daylight hours. Works at the R503 entrance will not cause cumulative significant impacts to local residents due the very short duration of both 110kV UGC works and the entrance works.
Construction traffic and road works along haul routes	1, 2, 4	Roads	Increased risk of injury from road traffic accidents	Rationale for Excluding: No likely health impacts As per Chapter 15: Material Assets (Roads), Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report, the local roads in the study area are lightly trafficked, with no records of serious traffic accidents on any of the local roads. The speeds recorded during traffic counts were well below to allowable limits (80km) on most of the roads in the area. In relation to the R503, this road is also lightly trafficked with 2 serious accident between 2005 and 2015. Construction traffic will not add substantial volumes of traffic, and in excess of 90% of road capacity will remain available. In addition, road safety measures have been designed into the UWF Grid Connection project through the use of appropriate advance warning signage, flagmen and traffic management measures. As a result, any changes to traffic flows as a result of the construction phase will be temporary and appropriately managed resulting in a neutral contribution to risk of injury from road traffic accidents. In relation to cumulative impacts with Castlewaller Windfarm grid connection works on L6009-0 and site entrance works off R503, cumulative construction impacts are not expected as works will either take place at separate times, or should works be carried out at the same time, then works on the grid connection for both projects are likely to be carried out by one crew, under the conditions of a road opening license, as the works are still temporary and of short duration, during daylight hours it is not expected that any combined works will cause any increased risk of road traffic accidents. Works

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				at the R503 entrance will not cause cumulative significant impacts because Castlewaller entrance works will take place on forestry lands, off the public road.
Operational Stage				
Employment opportunities	1, 2, 4	Financial transactions	Increased employment which is a wider determinant of health	Rationale for Excluding: Neutral health impacts Employment levels during the operational phase are very low for the UWF Grid Connection (c. 13 man days per year), UWF Related Works (c. 3 man days per year) and Upperchurch Windfarm (8 permanent jobs). Consequently, while there will be a positive impact to individual financial prosperity important to socio-economic health and wellbeing, this would not be of a magnitude sufficient enough to assess at a population level.
Noise impacts from the Mountphilips Substation, the Consented UWF Substation, and the Consented UWF Turbines	1, 2, 4	Air	Potential impact upon mental health (from stress, annoyance and sleep disturbance) and as a consequence, impact on cardiovascular health associated with exposure to noise and vibration	Rationale for Excluding: No likely health impacts UWF Grid Connection: There are 6 local residences (no schools or community facilities) within 400m of the Mountphilips Substation; the nearest of these is 385m to the east of the substation along the L2166-0 local road. A noise level of 60dB(A) was measured at 5m away from a representative substation, which has been calculated to result in a worst case noise level of 22dB(A) at 385m; this is below the background noise threshold of 35dB(A) for low background noise locations. The WHO state that "Guideline values for annoyance have been set at 50-55dB(A), representing daytime levels below which a majority of the adult population will be protected from becoming moderately or seriously annoyed, respectively". As the worst case noise level at 385m will be well below the 50dB(A) WHO guideline, it is expected that there will be no annoyance or consequential health impact as a result of the operation of the existing Mountphilips Substation. UWF Related Works: No noise will be omitted by the operational Telecom Relay Pole or by any other part of the UWF Related Works. Upperchurch Windfarm: The consented UWF Substation will emit a similar level of noise as the Mountphilips Substation. The nearest residence to the UWF Substation is similarly just less than 400m away (360m) and is the only residence within 400m from the Consented UWF Substation. In relation to the operational turbines, as stated in the RFI 2013, there are approximately 93 dwellings within 900m of the Consented UWF Turbines. Despite an increase in ambient noise levels as a result of the operational Consented UWF Turbines, the level of increase will be lower than WHO guideline values for annoyance, even in a worst case scenario. The

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				Grant of Permission explicitly states that "subject to compliance with the conditions set out below, the proposed development would not seriously injure the amenities of the area or of property in the vicinity, would not be prejudicial to public health and would be acceptable in terms of traffic safety and convenience". It is also considered that there is no potential for cumulative effects from all individual project elements as the noise emissions from the UWF Grid Connection (Mountphilips Substation) will not be heard in the same places as noise emissions from the Upperchurch Windfarm.
Operational transmission of electricity	1, 2, 4	Air	Potential impact on health as a result of exposure to EMF	Rationale for Excluding: Neutral health impacts. There are no residents or community facilities within 100m of Mountphilips Substation. There will be some increase in magnetic field levels at the 317 No. local residences and 17 No. community facilities (including 2 No. schools) which are within 100m of the 110kV UGC along the public road. The worst case increase in levels of magnetic fields at local residences and community facilities will range from 4.45µT to 0.13µT for residences/community/businesses between 5m and 30m from the 110kV UGC. These levels, albeit small increase, will rapidly reduce with distance from the cabling. All other properties will remain under 1.26µT and will be similar to existing ambient levels and it any case all increases remain substantially under the ICNIRP guideline limits of 100µT. At the 2 local schools (Lackamore National School and Rear Cross National School), the worst case increase in levels of magnetic fields is 0.123µT at Lackamore National School and 0.046µT at Rear Cross National School. There will be no increase in electric fields due to the complete screening by both the metallic sheath surrounding the cables and by the concrete and backfill materials above the cables. There are 6 No. local residences which are within 100m of both the 110kV UGC and the Internal Windfarm Cabling in the Knockmaroe and Knockcurraghboola Commons area. At these residences the cumulative, worst case increase in magnetic fields will be 0.046µT, which will increase ambient magnetic fields at the closest local residences to 0.246µT. The worst case in-combination ambient magnetic field levels due to both the UWF Grid Connection and the existing overhead line network relates to 1 No. local residence in Coole which is within 100m of

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				both the existing 220kV and the 110kV UGC, worst case EMF would be 0.99µT. Along the L6009-0 local road where both UWF Grid Connection 110kV UGC cables and Castlewaller Windfarm 110kV cables could be located, the worst case cumulative levels would be 56.7µT. All of these worst case levels remain below the more conservative 1998 International Commission on Non-Ionizing Radiation Protection (ICNIRP) magnetic field reference level of 100µT (ICNIRP, 1998). As a result, it is expected that there will be a Neutral impact to human health.
Operational traffic and road works along haul routes	1, 2, 4	Roads	Increased risk of injury from road traffic accidents	Rationale for Excluding: No likely health impacts As per Chapter 15: Material Assets (Roads), Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report, the local roads in the study are lightly trafficked, with no records of serious traffic accidents on any of the local roads. In relation to the R503, this road is also lightly trafficked with 2 serious accident on the R503 in the 10 years between 2005 and 2015. The speeds recorded during traffic counts were well below to allowable limits (80km) on most of the roads in the area. Operational traffic associated with the UWF Grid Connection, UWF Related Works and the Upperchurch Windfarm will add negligible volumes of traffic to the local or regional road network (either individually or cumulatively). In addition, the vast majority of vehicle journeys will be by van or four wheel drive vehicle. Any testing of Joint Bays (UWF Grid Connection) on public roads will be subject to traffic management with advance signage, flagmen/stop-go systems put in place. As a result, any changes to traffic flows as a result of the operation phase is not likely to cause health effects from increased risk of injury due to road traffic accidents.
Decommissioning Stage				
Rationale for Excluding: Neutral impacts No decommissioning of the UWF Grid Connection. Decommissioning activities associated with the UWF Related Works or the Upperchurch Windfarm will be minimal, temporary, intermittent, and will only be taking place during the day time. Therefore, no health impacts are anticipated.				

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7.2.5 Mitigation Measures for Impacts to Local Residents & Community

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 Residents & Community**.

7.2.6 Evaluation of Residual Impacts to Local Residents & Community

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Local Residents & Community above (Section 7.2.4) – i.e. **no adverse health impacts**.

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

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

The following Best Practice Measures have been developed, to support the Local Economy and Air, and indirectly **Local Residents & Community,** using industry best practice:

GC-BPM-09	Local Employment and Local Sourcing
GC-BPM-08	Minimising Dust Emissions from Site Activities
GC-BPM-10	Measuring Operational EMF Emissions

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

A Traffic Management Plan also forms part of the UWF Grid Connection Environmental Management Plan. The Traffic Management Plan (TMP) for the public roads will be a key construction contract document, the implementation of which will reduce possible impacts which may occur due to the presence of construction traffic and works on the public roads. It is a particular objective of this plan to control and minimise the traffic impacts of construction insofar as it may affect the local environment, local residents and the travelling public on the public roads close to and adjacent to the construction site, through measures to maximise the safety while keeping traffic flowing as freely as possible.

Local Residents & Community

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7.2.8 Summary of Impacts to Local Residents & Community

A summary of the Impact to Local Residents & Community is presented in Table 7-11.

Table 7-11: Summary of the impacts to Local Residents & Community

Impact to Local Residents & Community:	**Increased Employment**
Evaluation Impact Table	*Section 7.2.4.1*
Project Life-Cycle Stage	Construction Stage
UWF Grid Connection *Direct/indirect impact*	**Slight (positive)**
UWF Grid Connection *Cumulative impacts*	**Slight (positive)**
Element 2: UWF Related Works	Imperceptible (positive)
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 7.2.2.2.1
Element 4: Upperchurch Windfarm	Slight (positive)
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 7.2.2.2.1
Cumulative Impact:	
Whole UWF Project Effect	**Slight (positive)**
All Elements of the Whole UWF Project *cumulatively with* - Potential Bunkimalta Windfarm - Castlewaller Windfarm (consented windfarm, potential grid connection)	**Imperceptible (positive)**

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

7.3 Sensitive Aspect No.2: Transient People

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

The Human Health section draws from and builds upon the wider EIA technical disciplines, most notably, Chapter 12: Air (air quality, noise, vibration, and electromagnetic fields) and Chapter 15 Material Assets (Roads). The authors of this Human Health topic chapters used the results of the evaluations in the other topic chapters and appendices in order to evaluate any cross-factor effects to health.

7.3.1 BASELINE CHARACTERISTICS of Transient People

7.3.1.1 STUDY AREA for Transient People

The study area for Transient People in relation to the UWF Grid Connection is described in Table 7-12 and illustrated on Chapter 12: Air (Figure GC 12.3), Chapter 15: Material Assets (Roads) (Figure GC 15.3), these figures have been reproduced for the Human Health figures and are included in Volume C3 EIAR Figures.

Table 7-12: UWF Grid Connection Study Area for Transient People

Study Area for Transient People	Justification for the Study Area Extents
In order to evaluate cross-factor effects, the same geographical boundaries were used for Human Health as those used for Chapter 12: Air (Transient People), and Chapter 15: Material Assets - Roads (Road Users).	The justification for the geographic boundaries is consistent with Chapter 12: Air (Transient People) and Chapter 15: Material Assets - Roads (Road Users), thereby enabling the Human Health section to appraise the potential change in environmental determinants of health.

7.3.1.2 Baseline Context and Character of Transient People in the UWF Grid Connection Study Area

Transient people represent those who may work in or visit the area such as farm and forestry workers, road users, walkers and other recreational users.

The surrounding rural area of the UWF Grid Connection is comprised of agricultural land and countryside, with a number of minor roads and waymarked trails. Here, there is the potential for transient people to be present who are travelling, present for recreation purposes, or undertaking work on the land.

Specifically, in relation to waymarked trails, the Slievefelim Way and Ormond Way (cycle) are routed through the UWF Grid Connection study area.

7.3.1.3 Importance of Transient People

In the absence of good physical, mental and social health and wellbeing, individuals and communities become limited in achieving their full potential. Therefore, achieving and maintaining good health and wellbeing through prevention techniques rather than treatment is of utmost importance. In addition to the clear benefits of good health on an individual and community scale, healthy lifestyles and behaviours contribute to relieving any unnecessary burden on healthcare services across Ireland to maintain good quality, access, value, standards of care and patient outcomes.

Transient People
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7.3.1.4 Sensitivity of Transient People

It is difficult to obtain demographic and health status data for visitors classified as transient people as their origin is unknown. However, visitors to the area (for walking, bird watching etc.) will only be exposed to changes in the environment temporarily and as a result, are not considered particularly sensitive.

In relation to individuals who live and work on the land, such as farmers, or individual using the roads in the area, will also be temporarily exposed to changes in the environment associated with the UWF Grid Connection. It should be noted that recent research suggests that farmers are 7 times more at risk to mortality from circulatory diseases than other occupation groups (IFA, 2012) and as a result are considered marginally more sensitive to changes in the environment than the average population. However, due to the temporary nature of their exposure it persists that farmers are not considered particularly sensitive receptors.

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

As stated in Chapter 6: Population, Fáilte Ireland's *Tourism Facts* for recent years point to very strong growth in both international and domestic tourist numbers in Ireland. The statistics confirm that walking and hiking have maintained their strong popularity for tourists as overall numbers have grown, and it is likely that the number of walkers using the waymarked trails in the Slievefelim to Silvermines Upland Area will continue to increase slowly over time, notwithstanding that tourists and visitor favour tourism products in South Tipperary over those in North Tipperary.

Road user numbers are increasing very slowly. The number of people working on farmland and forestry land in the area is expected to remain the same due to changes in landuse practices typically happening very slowly over time.

7.3.1.6 Receiving Environment (the Baseline + Trends)

Any changes to the baseline environment are anticipated to occur slowly. Therefore, it is assumed that the baseline environment identified will be the receiving environment.

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7.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

7.3.2.1 Cumulative Evaluation Study Area

7.3.2.1.1 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 Transient People	Justification for the Study Area Extents
In order to evaluate cross-factor cumulative effects, the same geographical boundaries were used for Human Health as those used for Chapter 12: Air (Transient People) and Chapter 15: Material Assets - Roads (Road Users).	The geographic boundaries are consistent with Chapter 12: Air (Transient People) and Chapter 15: Material Assets - Roads (Road Users), thereby enabling the Human Health section to appraise the potential cumulative changes in environmental determinants of health.

The study area is illustrated on Chapter 12: Air Figure CE 12.3 and Chapter 15: Material Assets (Roads) Figure CE 15.3, these figures have been reproduced for the Human Health figures and are included in Volume C3 EIAR Figures.

7.3.2.1.2 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 7.3.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 7-13 and illustrated on Chapter 12: Air (Figure WP 12.3), Chapter 15: Material Assets (Roads) (Figure WP 15.3) (Volume C3 EIAR Figures), these figures have been reproduced for the Human Health figures and are included in Volume C3 EIAR Figures.

Table 7-13: Whole Project Cumulative Evaluation Study Area for Transient People

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	In order to evaluate cross-factor cumulative effects, the same geographical boundaries were used for Human Health as those used for Chapter 12: Air (Transient People), and Chapter 15: Material Assets - Roads (Road Users).	The geographic boundaries are consistent with Chapter 12: Air (Local Residents & Community), and Chapter 15: Material Assets - Roads (Road Users) thereby enabling the Human Health section to appraise the potential cumulative changes in environmental determinants of health.
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5:		

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
UWF Other Activities		

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

The evaluation of cumulative impacts to Transient People also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Transient People with either the UWF 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 Cumulative Evaluations (Section A2.1 .4.2).

The results of this scoping exercise are that: the existing Shannonbridge – Killonan 220kV OHL, existing Killonan – Nenagh 110kV OHL and Castlewaller Windfarm (potential grid connection) have been scoped in for evaluation of cumulative effects to Transient People.

7.3.2.2.1 Potential for Impacts to Transient People

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Transient People. The results of this evaluation are included in Table 7-14.

The location of, and study area boundary associated with the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 12.3 and Figure WP 15.3. The baseline character of the areas around these projects is described in Section 7.3.2.3.

Table 7-14: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Elements 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 any adverse health impacts to Transient People, as there will be as there will be: • No material impact on air quality, noise or vibration: as per Chapter 12: Air, Section 12.3.2.2.1, planting works associated with UWF Replacement Forestry will have a neutral impact on air quality as works will be carried out by hand using spades, with use of vehicles limited to personnel 4WD vehicles. There will be no mechanical noise or vibration sources during planting stage, as planting will be carried out by hand in grassland fields, therefore no noise or vibration impact will occur. During the growth stage, chainsaws may be used during thinning activities, however this type of activity will be infrequent, brief in nature and at a distance from Transient People. Potential exposure of Transient People to environmental health pathways are therefore not of a magnitude, timing or duration to cause impacts to their health during any planting or thinning activities. • No EMF emissions: there are no electrical or radio-communication parts associated with the UWF Replacement Forestry. Therefore, the UWF Replacement Forestry will not influence local EMF or result in any change in exposure, with no impact to health. • Extremely low traffic volumes: as per Chapter 15: Material Assets (Roads), Section 15.3.2.2.1, the planting programme will generate extremely low traffic volumes, with 1-2 vehicles movements per day over a one month period. As a comparative example this

	level of traffic is substantially less than the daily level of traffic generated by a single residential dwelling. During the growth stage, traffic will be in the region of 2 to 4 vehicle movements per year. Due to the extremely low traffic volumes associated with the UWF Replacement Forestry, it is considered that neutral effects will occur to Road Users on the local roads in the vicinity, with no impacts to the health of any Transient People who may be using the roads.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No potential for any adverse health impacts to Transient People, as there will be as there will be: • No material impact on air quality, noise or vibration: as per Chapter 12: Air, Section 12.3.2.2.1, any emissions from vehicles and equipment used will be of a short duration, transient in nature, and the relative change in air quality will be orders of magnitude lower than is required to quantify any material impact on health, any noise or vibration emitted by machinery or vehicles used to carry out the UWF Other Activities, will be in the context of background noise and vibration from regional or national roads, or will not be noticeable in the context of local traffic and farming activity. Notwithstanding the very low magnitude and brief duration of UWF Other Activities, any exposure of Transient People to dust, noise or vibration will be of a momentary duration as a person passes in close proximity to activities, and therefore no impacts to health are likely to occur. • No EMF emissions: there are no electrical or radio-communication parts associated with the UWF Other Activities. On this basis, there is no potential for changes in exposure to EMF, and no risk to health. • Extremely low traffic volumes: as per Chapter 15: Material Assets (Roads), Section 15.3.2.2.1, the traffic increases as a result of the Haul Route Activities (tree trimming, laying of matting, street furniture removal), will be in all cases considerably less than 1% of the current traffic volumes on these roads. Given that the normal day-to-day variation in traffic conditions can be as much as 10%, the relative change is not of a level to quantify any impact on health from risk of accident and injury due to traffic accidents. In addition, no works to the road network or road boundaries form part of the Overhead Line Activities or the Upperchurch Hen Harrier Scheme or Monitoring Activities, and taking into consideration the extremely low volumes of traffic associated with these activities, and the brief duration of any public road use, no effects to Road Users are likely, consequently there will be no impacts to the health of any Transient People who may be using the local roads.
Other Projects or Activities	
Shannonbridge – Killonan 220kV OHL Killonan – Nenagh 110kV OHL Castlewaller Windfarm	The existing Shannonbridge – Killonan 220kV OHL and existing Killonan – Nenagh 110kV OHL are included for the evaluation of cumulative cross-factor effects from changes to EMF levels in the Air. The potential Bunkimalta Windfarm is included for the evaluation of cumulative cross-factor effects from changes to the local economy. The potential Castlewaller Windfarm grid connection is included for the evaluation of cumulative cross-factor effects from changes to air quality, noise and damage to road

	pavements during construction, and for changes to EMF levels during the operational stage.

7.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

Transient people represent those who may work in or visit the area such as farm and forestry workers, road users, walkers and other recreational users.

The surrounding rural area of UWF Related Works and Upperchurch Windfarm is comprised of agricultural land and countryside, with a number of minor roads and waymarked trails. Here, there is the potential for transient people to be present who are travelling, present for recreation purposes, or undertaking work on the land.

7.3.2.3.1 Element 2: UWF Related Works

Specifically, in relation to waymarked trails, the Eamonn a Chnoic Loop, Ormond Way (walking and cycle) are routed through the UWF Related Works study area, see Figure WP 12.3.

7.3.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 7.3.2.2.1

7.3.2.3.3 Element 4: Consented Upperchurch Windfarm

Walkers may also be present on the Eamonn a Choic Loop or Ormond Way walking route, which is currently under development, where these walks are routed through the consented Upperchurch Windfarm.

Consideration of the Passage of Time: Human health was not explicitly evaluated in the 2013 and 2014 assessments for the consented Upperchurch Windfarm. However, this environmental factor is now considered in the evaluations in this EIAR for UWF Grid Connection, and a cumulative evaluation for Transient People is carried out for Upperchurch Windfarm.

7.3.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 7.3.2.2.1

7.3.2.3.5 Other Projects or Activities

Farm or forestry workers or road users may be present within 100m of both the UWF Grid Connection and the Shannonbridge – Killonan 220kV OHL or the Killonan – Nenagh 110kV OHL.

A potential grid connection for the consented Castlewaller Windfarm, is predominantly on public roads to Killonan Station outside Limerick City. Part of the potential underground grid connection route is along the L6009-0, just east of Newport Town (*along which a section of the UWF Grid Connection 110kV UGC is currently proposed*). A potential site entrance on the R503 (along the UWF Grid Connection route) was also included in the SID Pre-Application consultations for the potential grid connection. Farm or forestry workers or road users may be present within 100m of the potential Castlewaller Windfarm grid connection works on the L6009-0. The Castlewaller Windfarm project is at a substantial separation distance to the other Whole UWF Project Elements.

7.3.3 PROJECT DESIGN MEASURES for Transient People

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 are 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 7-8 are relevant to the Environmental Factor, Human Health, and in particular to the sensitive aspect **Transient People**.

Table 7-15: UWF Grid Connection Project Design Measures relevant to Local Residents & Community

PD ID	Project Design Environmental Protection Measure (PD)
PD04	All construction works will be carried out during daylight hours
PD07	110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads.
PD10	Flag-men will be used at 110kV UGC works locations on the public roads subject to one lane closures. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the public road network in a in a safe and efficient manner. The works will be carried out according to the Traffic Management Plan for UWF Grid Connection. The Traffic Management Plan forms part of the Environmental Management Plan.
PD12	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.
PD13	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the Promoter will fund the costs of Tipperary County Council engaging a chartered Civil Engineer to oversee quality control and compliance with drawings, specifications and road opening conditions for the duration of the works

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7.3.4 EVALUATION OF IMPACTS to Transient People

In this Section, the likely direct and indirect effects of the UWF Grid Connection and the likely cumulative effects of the Other Elements of the Whole UWF Project are identified and evaluated.

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

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

Table 7-16: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
No Impacts were Included for Further Evaluation	*Potential impact upon cardiovascular and respiratory health from changes to air quality (construction stage)*
	Potential impact upon mental health (from stress, annoyance and sleep disturbance) and as a consequence, impact on cardiovascular health associated with exposure to noise and vibration (construction stage)
	Increased risk of injury from road traffic accidents (construction stage)
	Potential impact upon mental health (from stress, annoyance and sleep disturbance) and as a consequence, impact on cardiovascular health associated with exposure to noise and vibration (operational stage)
	Increased risk of injury from road traffic accidents (operational stage)
	Potential impact on health as a result of exposure to EMF (operational stage)
	Decommissioning Effects

The source-pathway-receptor links and the rationale for excluded impacts are described in Section 7.3.4.1.

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7.3.4.1 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 7-16 below.

Table 7-17: Description and Rationale for Excluded Impacts to Transient People

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

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Air quality impacts from vehicle emissions and dust (PM10 and PM2.5)	1, 2, 4	Air	Potential impact upon cardiovascular and respiratory health from changes to air quality	Rationale for Excluding: Neutral health impacts According to IAQM guidelines, the sensitivity of the surrounding area to human health impacts is Low and the majority of waymarked trails and agricultural/forestry lands (where workers may be present) are greater than 50m away from construction works or construction haul routes. In addition, background levels of pollutants are significantly below relevant EU limit values set for the protection of human health. As a result, any impact to air quality during the construction phase will be temporary, intermittent and not of a concentration or exposure to quantify adverse health impact to any Transient People. In relation to cumulative impacts with Castlewaller Windfarm grid connection works on L6009-0 and site entrance works off R503, cumulative construction impacts are not expected as works will either take place at separate times, or should works be carried out at the same time, then works on the grid connection for both projects are likely to be carried out by one crew, with no material cumulative increase in dust levels and although a longer construction periods is possible on the local road L6009-0, this will not cause significant effects to transient people, as the works are still temporary and of short duration, during daylight hours. Works at the R503 entrance will not cause cumulative significant impacts to local residents due the very short duration of both 110kV UGC works and the entrance works.
Noise impacts from machinery	1, 2, 4	Air	Potential impact upon mental health (from stress, annoyance and sleep disturbance) and as a consequence, impact on cardiovascular health associated with exposure to noise and vibration	Rationale for Excluding: Neutral health impacts The nature of construction noise will be temporary and intermittent. As a result, noise generated during the construction phase presents limited opportunity for any risk of annoyance. When considered in the context of the very short duration of works within close proximity to any waymarked walks and the linear nature of works in agricultural lands or forestry lands, adverse health effects are not likely to occur to Transient People who may be working or walking close to construction works. In relation to cumulative impacts with Castlewaller Windfarm grid connection works on L6009-0 and site entrance works off R503, cumulative construction impacts are not expected as works will either take place at separate times, or should works be carried out at the

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				same time, then works on the grid connection for both projects are likely to be carried out by one crew, with no material cumulative increase in noise levels and although a longer construction periods is possible on the local road L6009-0, this will not cause significant effects to transient people, as the works are still temporary and of short duration, during daylight hours. Works at the R503 entrance will not cause cumulative significant impacts to local residents due the very short duration of both 110kV UGC works and the entrance works.
Construction traffic and road works along haul routes	1, 2, 4	Roads	Increased risk of injury from road traffic accidents	Rationale for Excluding: No likely health impacts As per Chapter 15: Material Assets (Roads), Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report, the local roads in the study area are lightly trafficked, with no records of serious traffic accidents on any of the local roads. The speeds recorded during traffic counts were well below allowable limits (80km) on most of the roads in the area. In relation to the R503, this road is also lightly trafficked with 2 serious accident in the 10 year period between 2005 and 2015. Construction traffic will not add substantial volumes of traffic, and in excess of 90% of road capacity will remain available. In addition, road safety measures have been designed into the UWF Grid Connection and UWF Related Works projects through the use of appropriate advance warning signage, flagmen and traffic management measures. As a result, any changes to traffic flows as a result of the construction phase will be temporary and appropriately managed resulting in a neutral contribution to risk of injury to Transient People from road traffic accidents. In relation to cumulative impacts with Castlewaller Windfarm grid connection works on L6009-0 and site entrance works off R503, cumulative construction impacts are not expected as works will either take place at separate times, or should works be carried out at the same time, then works on the grid connection for both projects are likely to be carried out by one crew, under the conditions of a road opening license, as the works are still temporary and of short duration, during daylight hours it is not expected that any combined works will cause any increased risk of road traffic accidents. Works at the R503 entrance will not cause cumulative significant impacts because Castlewaller entrance works will take place on forestry lands, off the public road.
Operational Stage				
Noise impacts from the Mountphilip	1, 4	Air	Potential impact upon mental health (from	Rationale for Excluding: Neutral health impacts There are no waymarked trails within 400m of the Mountphilips Substation or the Consented UWF Substation and as a result, there is no potential for

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
s Substation, Consented UWF Substation, and Consented UWF Turbines			stress or annoyance) and as a consequence, impact on cardiovascular health	health impacts to Transient People. Noise will be emitted by the operational UWF Turbines; while turbines will be heard in close proximity by transient people, the noise will not be intrusive (either alone or cumulatively with neighbouring Milestone Windfarm turbines) and as a result there will be a Neutral impact to human health.
Operational traffic and road works along haul routes	1, 2, 4	Roads	Increased risk of injury from road traffic accidents	Rationale for Excluding: No likely health impacts As per Chapter 15: Material Assets (Roads), Appendix 15.4: Stage 1 Road Safety Audit & Review and Appendix 15.1 Traffic & Transportation Assessment Report, the local roads in the study are lightly trafficked, with no records of serious traffic accidents on any of the local roads. The speeds recorded during traffic counts were well below to allowable limits (80km) on most of the roads in the area. In relation to the R503, this road is also lightly trafficked with 2 serious accidents in the 10 year period between 2005 and 2015. Operational traffic associated with the UWF Grid Connection, UWF Related Works and the Upperchurch Windfarm will add negligible volumes of traffic to the local or regional road network (either individually or cumulatively). In addition, the vast majority of vehicle journeys will be by van or four wheel drive vehicle. Any testing of Joint Bays on public roads will be subject to traffic management with advance signage, flagmen/stop-go systems put in place. As a result, any changes to traffic flows as a result of the operation phase is not likely to cause health effects to Transient People from increased risk of injury due to road traffic accidents.
Operational transmission of electricity	1, 2, 4	Air	Potential impact on health as a result of exposure to EMF	Rationale for Excluding: Neutral health impacts As per Chapter 12: Air, Section 12.3.4.1, the maximum level of cumulative EMF in relation to 110kV UGC and UWF Related Works/Upperchurch Windfarm will be generated on the local road L-2264-50, where some agricultural and forestry lands and a short section of the Ormond Way cycle and walking routes will be within 100m of both the 110kV UGC and the Internal Windfarm Cabling in Knockmaroe/Knockcurraghbola townlands, where the Internal Windfarm Cabling is routed across the 110kV UGC on the L-2264-50. The worst case possible levels will be 55.8 µT at a public road crossing point. On the Upperchurch Windfarm site, farm/forestry workers and walkers on the Ormond Way or Eamonn a Chnoic Loop will be within 100m of both the Internal Windfarm Cabling and the Consented UWF Turbines. The worst case possible cumulative

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				increase in magnetic field levels will be 7.8 µT beside the turbine towers and over Internal Windfarm Cabling. The worst case in-combination ambient magnetic field levels relates to farm/forestry workers who are within 100m of both the 110kV UGC and the existing 110kV overhead line, or within 100m of both the 110kV UGC and the existing 220kV overhead line in Mountphilips, where worst case EMF would be 69µT and 79.7µT, respectively. The worst case in-combination ambient magnetic field levels would be 0.98µT due to both the UWF Grid Connection and the existing overhead line network relates to 1 No. local residence in Coole which is within 100m of both the existing 220kV and the 110kV UGC. Along the L6009-0 local road where both UWF Grid Connection 110kV UGC cables and Castlewaller Windfarm 110kV cables could be located, the worst case cumulative levels would be 56.7µT. These values remain below the more conservative 1998 International Commission on Non-Ionizing Radiation Protection (ICNIRP) magnetic field reference level of 100µT (ICNIRP, 1998). As a result, it is expected that there will be no impact to human health.
Decommissioning Stage				
Rationale for Excluding: Neutral impact The UWF Grid Connection will not be decommissioned. Decommissioning activities will be minimal in relation to UWF Related Works and Upperchurch Windfarm and decommissioning activities will be temporary, intermittent, and will only be taking place during the day time.				

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7.3.5 Mitigation Measures for Impacts to Transient People

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 occur to to Transient People.

7.3.6 Evaluation of Residual Impacts to Transient People

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Grid Connection (Section 7.3.1), i.e. **neutral impacts.**

7.3.7 Application of Best Practice and the EMP for Transient People

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

The following Best Practice Measures have been developed using industry best practice, to provide further protection to Air and Road Users, and indirectly to **Transient People:**

GC-BPM-08	Minimising Dust Emissions from Site Activities
GC-BPM-10	Measuring Operational EMF Emissions

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

A Traffic Management Plan also forms part of the UWF Grid Connection Environmental Management Plan. The Traffic Management Plan (TMP) for the public roads will be a key construction contract document, the implementation of which will reduce possible impacts which may occur due to the presence of construction traffic and works on the public roads. It is a particular objective of this plan to control and minimise the traffic impacts of construction insofar as it may affect the local environment, local residents and the travelling public on the public roads close to and adjacent to the construction site, through measures to maximise the safety while keeping traffic flowing as freely as possible.

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7.3.8 Summary of Impacts to Transient People

The topic authors conclude that impacts to Transient People as a consequence of the development of the UWF Grid Connection will be neutral.

Table 7-18: Summary of the impacts to Transient People

Impact to Transient People:	**Impact**
Impact Evaluation	*Section 7.3.4.1 – All impacts excluded*
Project Life-Cycle Stage	All
UWF Grid Connection	**Neutral Impacts**
Element 2: UWF Related Works	Neutral Impacts
Element 3: UWF Replacement Forestry	No Potential for Impact - Evaluated as Excluded, see Section 7.3.2.2.1
Element 4: Upperchurch Windfarm	Neutral Impacts
Element 5: UWF Other Activities	No Potential for Impact - Evaluated as Excluded, see Section 7.3.2.2.1
Cumulative Impact:	
Whole UWF Project Effect	**Neutral Cumulative Impacts**
All Elements of the Whole UWF Project *cumulatively with* - Shannonbridge – Killonan 220kV OHL, - Killonan – Nenagh 110kV OHL - Castlewaller Windfarm (potential grid connection)	**Imperceptible (positive)**

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

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7.4 Reference List

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

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

Glossary of Terms

Term	**Definition**
Afforestation	The establishment of a forest or stand of trees (forestation) in an area where there was no previous tree cover
Anadromous	Fish that migrate up rivers from the sea to spawn
Appropriate Assessment	An assessment required by the EU Habitats Directive where a project (or plan) would be likely to have a significant effect on a European site, either alone or in combination with other plans or projects
Avoidance	Prevention of impacts occurring, having regard to predictions about potentially negative environmental effects (e.g. project decisions about site location or design).

Term	Definition
Baseline Environment	The conditions that would pertain in the absence of the proposed project at the time that the project would be constructed / operated / decommissioned. The definition of these baseline conditions should be informed by changes arising from other causes (e.g. other consented developments)
Bern Convention	Convention on the Conservation of European Wildlife and Natural Habitats in Bern in 1992 ensures that governments take into account the conservation needs of species during the formulation of planning and development policies
Biodiversity	The biological diversity of the earth's living resources. The total variability among organisms and ecosystems. In common usage, and within these Guidelines, biodiversity is used to describe the conservation of the natural environment, rather than describing the variation within it.
Catchment	A catchment area is a hydrological unit. Each drop of precipitation that falls into a catchment area eventually ends up in the same river. Catchment areas are separated from each other by watershed
Climate change	A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.
Compensation	Measures taken to make up for the loss of, or permanent damage to, ecological features despite mitigation. Any replacement area should be similar in terms of biological features and ecological functions that have been lost or damaged, or with appropriate management have the ability to reproduce the ecological functions and conditions of those biological features.
Competent Authority	An organisation or individual who is responsible for determining an application for consent for a project. Competent authorities in relation to Appropriate Assessment in Ireland are set out in SI 477 of 2011.
Conceptual Site Model	Model used to facilitate the identification of source-pathway-receptor links between a project and the receiving environment
Connectivity	A measure of the functional availability of the habitats needed for a particular species to move through a given area. Examples include the flight lines used by bats to travel between roosts and foraging areas or the corridors of appropriate habitat needed by some slow colonising species if they are to spread.
Conservation objective	Objective for the conservation of biodiversity (e.g. specific objective within a management plan or broad objectives of policy).
Conservation status	The state of a species or habitat including for example, extent, abundance, distribution and their trends.
Couches	Overground nest like structure used by Otter for resting and/or breeding
Cumulative impact / effect	Additional changes caused by a proposed development in conjunction with other developments or the combined effect of a set of developments taken together.
Degradation	The condition or process of degrading or being degraded.
Designated Sites	General term for sites which have been designated for nature conservation and for which legal protection has been conferred onto the sites. In Ireland, these included Special Areas of Conservation and Special Protection Areas. In addition to Natural Heritage Areas designated under national legislation.
Displacement	The action of moving something from its place or position.
Distribution	The geographical presence of a feature. This can depend on factors such as climate and altitude.

Term	Definition
Disturbance	Disturbance is a temporary change in environmental conditions that causes a pronounced change in an ecosystem.
Ecosystem	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit
Effect	Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow. See also 'Impact'.
EIAR	Environmental Impact Assessment Report
Endangered	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (Section V of IUCN Red List Categories and Criteria (2012) Version 3.1 2nd edn.), and it is therefore considered to be facing a very high risk of extinction in the wild.
Enhancement	The genuine enhancement of the natural heritage interest of a site or area because the project includes improved management or new habitats or features, which are better than the prospective management, or the habitats or features present there now. There is, therefore, a net or new benefit to the natural heritage
Environmental Impact Assessment (EIA)	Assessment of projects carried out under the EIA Directive and Regulations.
Environmental Impact Assessment Report	A document describing the effects of a project on the environment prepared during EIA
European sites	Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) which comprise the Natura 2000 network which are designated under European legislation
Fauna	Fauna is all of the animal life of any particular region or time.
Favourable condition	Satisfactory condition of an ecological feature. In some cases, favourable condition is specifically defined (e.g. for some designated sites).
Flora	Flora is the plant life occurring in a particular region or time.
Flora Protection Order	The current list of plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 2015, which supersedes orders made in 1980, 1987 and 1999.
Fragmentation	The breaking up of a habitat, ecosystem or land-use type into smaller parcels with a consequent impairment of ecological function.
Groundwater	Groundwater is the water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers.
Habitat	The place or type of site where an organism or population naturally occurs. Often used in the wider sense referring to major assemblages of plants and animals found together
Hinterland	Area of surrounding landscape
Holts	Created or existing underground shelter used by Otter for resting and/or breeding
Hydrological	Associated with or related to the scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.
Impact	Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow. See also 'Effect'
Important ecological features	Ecological features requiring specific assessment within EcIA. Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat / species rarity).

Term	Definition
Larvae	Plural form of larva; The active immature form of an insect, especially one that differs greatly from the adult and forms the stage between egg and pupa
Life-cycle stages	In this context, the stages of a project; i.e. Construction, Operational and Decommissioning
Mitigation/Mitigation Measures	Measures taken to avoid or reduce negative impacts. Measures may include: locating the development and its working areas and access routes away from areas of high ecological interest, fencing off sensitive areas during the construction period, or timing works to avoid sensitive periods. An example of a reduction measure is a reed bed silt trap that is designed to minimise the amount of polluted water running directly into an ecologically important watercourse. See also compensation (which is separate from mitigation).
Natura Impact Statement	Under the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), an EcIA report including the scientific assessment of a plan or project in relation to relevant Natura 2000 sites and other information required to enable a competent authority to carry out an Appropriate Assessment
Natural Heritage Area	The basic designation for wildlife in Ireland is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection.
Non-native invasive species	Any non-native animal or plant that has the ability to spread causing damage to the environment, the economy, our health and the way we live. Equivalent of 'alien species' as used by the Convention on Biological Diversity
Non-Volant	Incapable of flight
Population	A collection of individuals (plants or animals), all of the same species and in a defined geographical area.
Precautionary Principle	The principle that the absence of complete information should not preclude precautionary action to mitigate the risk of significant harm to the environment.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.
Proposed Natural Heritage Area	Proposed NHAs (pNHAs) were published on a non-statutory basis in 1995 and have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats are subject to limited protection, in the form of agri-environmental farm planning schemes, NPWS approval for afforestation schemes on pNHA lands and recognition of the ecological value of pNHAs by Planning and Licencing Authorities
Qualifying Interest	Habitats listed on Annex I and Species listed on Annex II of the EU Habitats Directive for which Special Areas of Conservation have been designated.
Rarity	A measure of relative abundance
Receptors	Any ecological or other defined feature (e.g. human beings) that is sensitive to or has the potential to be affected by an impact.
Replacement	The creation of a habitat that is an acceptable substitute for the habitat which has been lost.
Restoration	The re-establishment of a damaged or degraded system or habitat to a close approximation of its pre-degraded condition.
Riparian	Relating to or situated on the banks of a river
Roost	Resting place for a bird or bat
SAC/cSAC	Site designated according to the habitats directive. Special area of conservation means a site of Community importance designated by the Member States through a statutory, administrative and/or contractual act where the necessary conservation

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

List of Abbreviations

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

Executive Summary of the Biodiversity Chapter

The effects of the development on biodiversity in the area is assessed with respect to terrestrial and aquatic ecosystems of the receiving environment and the terrestrial, aquatic and avian fauna present therein.

Baseline Environment: The proposed Mountphilips Substation is located on agricultural grassland, on lower lying land to the west of the Slievefelim to Silvermines upland area. Outside the Mountphilips Substation site, the proposed 110kV UGC will cross through the Slievefelim to Silvermines uplands entirely under paved roads – predominately the Regional Limerick to Thurles Road (R503), in order to connect said Mountphilips Substation to the Consented Upperchurch Windfarm Substation to the east of the uplands. Due to the location of the 110kV UGC wholly within paved roads, the immediate vicinity of the 110kV UGC is dominated by agricultural grassland and other habitats reflective of this e.g. roadside hedgerows, treelines and earth banks, with numerous dwellings, farm buildings and associated gardens, amenity grassland, hedges and lawns. The wider surrounding environment is representative of typical upland habitats, and includes lands under active management for agriculture and forestry.

Field Surveys: To establish the ecosystems and species present, various field surveys were carried out including; **Field Walking** of all the works locations; **Habitat Surveys** of all **terrestrial habitats** within a 50m buffer of work locations; **Aquatic Ecology/Fisheries Survey** of the watercourse characteristics of all UGC crossing locations; **Hen Harrier Surveys** to identify breeding behaviour, active nests, availability of nesting and foraging habitats within 2km of each identified nest location, habitat and prey item presence within 150m of the construction works boundary and winter roost presence within 3.6km. Satellite imagery was examined and ground-truthing was carried out. Up to date information from local Hen Harrier experts and the NPWS informed these surveys; **General Birds Surveys** at the Mountphilips Substation site and **Kingfisher** Habitat Suitability Surveys within 300m of twenty-six crossing locations (in tandem with **Otter Surveys**) in addition to dedicated breeding surveys; buildings were noted for potential suitability for **Breeding Barn Owls**; **Bat Surveys** were conducted. Buildings within 50m of the 110kV UGC, were appraised for their suitability for roosting bats. Mature trees with bat roost suitability within 50m of the UWF Grid Connection construction works area, were inspected from ground level and all of watercourse crossing structures (i.e. bridges and culverts) were inspected for bat activity/roosts. Bat Activity Surveys using auto-mated detectors were carried out at four locations near the Mountphilips Substation site and two locations near the consented Upperchurch Windfarm substation; **Non-Volant Mammals** present within 50m of the proposed works were surveyed; and **Amphibians and Reptiles** occurring within the study area were recorded during the course of all site walkovers for habitat, mammal and bird surveys.

Survey Results for Sensitive Aspects in the Baseline Environment: Birds, bats and other mammals, amphibians, reptiles and invertebrates are present within the receiving environment. The 110kV UGC passes through the boundary of the Slievefelim to Silvermines Mountains SPA for 8km, along the R503. The SPA is designated for the protection of Hen Harrier. The 110kV UGC overlaps the boundary of the Lower River Shannon at 6 No. locations on the public road, mainly along the Regional Road (R503). The SAC is designated for the protection of aquatic habitats, and salmonids and freshwater aquatic species. Other European Sites, including the Lower River Suir SAC and the Clare Glen SAC, along with nationally designated NHAs and pNHAs are also found within the surrounding area. 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. There are three main watercourses along the route of the 110kV UGC, all of which are within the River Shannon catchment; the Newport River (crossed at Rockvale Bridge), the Clare (Annagh) River (crossed at Tooreenbrien Bridge) and the Bilboa River (crossed at Anglesey Bridge). At these crossing locations all three watercourses are evaluated as containing good salmonid habitat, with good/high biological water quality and good ecological status. Crossing works required for the 110kV UGC at these three locations

will be in the road pavement within the bridge structures. The majority of watercourse crossings for UWF Grid Connection are characterised as minor streams and land drains, which have been subject to previous anthropogenic modification (arterial drainage, drainage maintenance, channel modification, abstractions, diversions, etc.). Aspects of the topic Biodiversity, which were deemed to be Sensitive to the development are **European Sites; National Sites; Aquatic Habitats & Species; Terrestrial Habitats; Hen Harrier; General Bird Species; Bats; Non-Volant Mammals; Amphibians & Reptiles and Marsh Fritillary** *(Other elements of the Whole UWF Project only)***.**

Project Design Measures: The UWF Grid Connection development as evaluated in the EIA Report incorporates Project Design Measures or mitigation measures to avoid, prevent or reduce negative impacts on Biodiversity. There are fifty-six project deign environmental protection measures developed to protect Biodiversity in the receiving environment and seven Best Practice Measures, developed specifically to protect surface water quality. Protection of the water quality and the existing drainage regime will be managed under a Surface Water Management Plan (SWMP), while a bespoke Invasive Species Management Plan has been developed to prevent the introduction and/or spread of invasive species. These Plans will be implemented through the Environmental Management Plan by the appointed Contractor during the construction stage of the UWF Grid Connection and 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 European Sites

The findings of the effects of the UWF Grid Connection (either alone or in combination with other projects) on European Sites are fully considered and evaluated in the Appropriate Assessment Report (NIS) for the development. In line with EIA Directive Guidance, the findings of the NIS are summarised in the EIA Report (in this case the Biodiversity Chapter).

A total of 23 European or Natura Sites were identified for screening. The results of the screening was that UWF Grid Connection has potential, via impact pathways, to cause effects to the four European Sites - the Lower River Shannon SAC; Lower River Suir SAC; Clare Glen SAC; and the Slievefelim to Silvermines Mountain SPA which is designated specifically for the Hen Harrier bird.

- 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 110kV UGC is located within the boundary of the Lower River Shannon SAC at six points along public roadways.
- No part of the UWF Grid Connection overlaps the boundary of the **Lower River Suir SAC** – the 110kV construction works are located c.12km upstream of the River Suir SAC, where the last c.1.5km of the UGC route is located in the Clodiagh (Tipperary) local surface water body (sub-basin) which exists within the Suir_SC_030 sub-catchment.
- No part of the UWF Grid Connection overlaps the boundary of the **Clare Glen SAC**. Clare Glen SAC comprises a wooded area on both banks of the Clare River approximately c.2.2km downstream of the 110kV UGC (on the R503 Thurles to Limerick Regional Road) within the Annagh (Tipperary) local surface water body.
- The Mountphilips Substation is not located within the **Slievefelim to Silvermines Mountain SPA**; however, the 110kV UGC, which is 30.5km in length, passes through the boundary of the SPA for 8km in total entirely within the R503 Thurles to Limerick Regional Road.

European Site are considered to be of **International Importance**. The UWF Grid Connection was evaluated for cumulative effects with other elements of the Whole UWF Project; as part of a Whole UWF Project effect and with Other Projects and Activities (Milestone Windfarm, Newport Town Park, Rearcross Quarry,

Curraghduff Quarry, Castlewaller Windfarm, potential Bunkimalta Windfarm, and the Activities of Forestry, Agriculture, Turf-Cutting.

The Mitigation measures (Project Design Measures, Best Practice Measures, Surface Water Management Plan, Invasive Species Management Plan, Traffic Management Plan) prepared specifically for this project have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. The Mitigation Measures are considered to be robust and proven measures which will avoid significant adverse effects to European Sites.

Summary Impacts to European Sites

In summary the findings of the NIS concludes that, 'following the examination and analysis presented, it can be concluded on a reasoned basis, that the proposed UWF Grid Connection development will not result in adverse effects on the Integrity of European Sites, in circumstances where no reasonable scientific doubt remains'.

Summary of the Likely Impact to National Sites

Bleanbeg Bog NHA, Grageen Fen and Bog NHA and Mauherslieve Bog NHA are within 15km of the UWF Grid Connection. It is evaluated that there is no potential for effects because the development will not overlap any NHA boundary; the separation distance between the development and the NHA sites; the 110kV UGC will be located within the carriageway of public roads, and therefore there is an absence of ecological connectivity; the development is located downslope of all 3 No. NHA sites, and therefore it is evaluated that there are no source pathway links for hydrological effects and no likelihood of indirect habitat effects to these NHAs.

Summary of the Likely Impact on Aquatic Habitats & Species

Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community. **The impact of the development is evaluated as Slight to Slight-moderate** for decrease in instream aquatic habitat quality; **Slight to Moderate** for riparian habitat degradation and **Slight** for Changes to flow regime, disturbance or displacement and spread of invasive species. The rationale for this evaluation is generally because instream works are only required at 3 No. locations which have all been in some way altered by the existing landuse (i.e. agriculture or public road infrastructure); these works will only be undertaken during the IFI specified period (July – September); will not be undertaken without isolation of flow within the watercourse, and the removal of fish; all the remaining watercourses will be crossed using the existing structures (bridges or culverts) and the majority of all the watercourses to be crossed have low / no fisheries value. The frequency of works is once for any culvert replacement that might be required; the duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat; the brief to temporary duration and reversibility of any effects and the implementation of water quality Project Design protection measures and Best Practice Measures; and the implementation of the Invasive Species Management Plan and adherence to best practice Biosecurity Protocols (IFI, 2010). The **cumulative impact and the Whole UWF Project cumulative impact is evaluated as Imperceptible to Moderate and No Likely Impact**. The cumulative impact of the Whole UWF Project with other projects and activities in the area, will be **Slight and No Likely Impact**.

Summary the Likely Impact on Terrestrial Habitats

Within the construction works area, the Public Road and other built surfaces accounts for 82% of the habitat concerned. Within 50m of the construction works area the dominant habitats present are improved agricultural grassland (36%); improved built land (15%), wet grassland (13%), and a mosaic of built land and amenity grassland (10.5%) which together make up 75% of all habitats present. Conifer plantation and scrub and to a much lesser extent, very small amounts of other habitat and habitat mosaics make up the remaining habitats within 50m of the construction works area. There are no Flora Protection Order (FPO) species present. There are invasive plant species present at various locations. Habitats of international conservation importance are located at four of the locations where the UGC passes though the boundary of the Lower River Shannon SAC. Habitats of National Importance in the area include the Newport River; Clare River; Bilboa River and Upland/Eroding Streams habitats which are hydrologically connected to the Lower River Shannon SAC. Habitats of Local Importance in the area include woodland; hedgerows; tree lines; scrub and small areas of Oak-birch-holly woodland; Wet heath/Wet grassland habitat mosaic and Lowland blanket bog. Due to the location of 8km of the 110kV UGC within an SPA designated for Hen Harrier, a number of habitats along the route support the structure and function of the SPA. This primarily includes foraging habitats in the open landscape (grassland, heath and bog) habitats.

Terrestrial Habitats are sensitive to direct land take, pollution, and environmental changes resulting from modification, such as increased drainage. The diversity of habitats is particularly sensitive to encroachment from invasive species. **The impact of the development is evaluated as Imperceptible** for Reduction in Terrestrial Habitats; Hedgerow Severance and Loss of High Nature Value Trees at the Mountphilips Substation Site generally because the vast majority of the construction works areas (82%) are on paved roads; the low sensitivity of the habitats for which change will occur - at Mountphilips Substation site, almost all of the land use change is on improved agricultural grassland, which has been evaluated as having lower value; at the Substation Site entrance hedgerow severance to create sightlines, will be replaced immediately with new hedgerow and semi-mature trees behind the new sightlines to avoid fragmentation effects; the very low extent of permanent hedgerow severance, with net gain due to new hedgerow planting along the new access road and no noticeable adverse contrast with baseline conditions. There is **no cumulative impact. The Whole UWF Project impact is evaluated as Not Significant to Moderate (Positive)** because of the net gain of the tree replanting and the Upperchurch Hen Harrier Scheme.

Summary the Likely Impact on Hen Harrier

Hen Harrier Study Area Extents: The extent of the Study Areas have been derived from sources such as published literature on Hen Harrier, in addition to Best Practice Guidance available within the Irish and UK Guidance, in particular Scottish Natural Heritage (SNH).

1 **Within 2km from the UWF Grid Connection construction works area boundary in all directions**, for breeding sites (*confirmed nest site or centre point of observed evidence of breeding behaviour identified during the breeding season*); territories; availability of foraging (hunting) habitats and communal winter roost sites – **in accordance with SNH Guidelines**.

2 **Within 2km of identified nests**, in relation to the availability of suitable **breeding and foraging Habitat** - **foraging habitat loss** within 2km of a Hen Harrier nest may potentially have negative effects on breeding success.

3 **Within 150m of the construction works area** boundary in all directions- in relation to **disturbance displacement to foraging Hen Harrier during the breeding season**, and effective habitat loss as a result - **150m is the most suitable Minimum Approach Distance (MAD)** indicated for likely disturbance in respect of Hen Harrier.

4 Within **150m of the construction works area boundary in all directions for prey item availability** - professional Judgement, based on the most suitable **MAD recommended** for Hen Harrier.

5 Within **50m of the construction works area boundary** in all directions for **General Habitats** - Professional Judgement and as per **Best Practice**.

In Ireland, the Hen Harrier is confined largely to heather moorland and young forestry plantations, where they nest on the ground. Hen Harrier foraging habitat preferences during the breeding season, are generally biased towards moorland, grassland mosaics and pre-thicket forest habitats which support larger numbers of prey species, their preferred being small birds such as Meadow Pipits and Skylarks and small mammals such as Bank Voles and mice. Hen Harrier are considered as 'central-place' foragers with most foraging taking place during the breeding season within a 'core range' of 2km from nests. During the breeding season females hunt closer to nest locations (typically <1km) whereas males hunt further away. In a remote tracking study in the Irish context, the concentration of Hen Harrier hunting behaviour was more than 10 times higher within 1 km of the nest than it was between 2 and 5 km from the nest. During winter, Hen Harriers gather at communal or solitary roost sites. In Ireland the majority of these roost sites are located in reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse or saltmarsh.

Context of Hen Harrier in the Slieve Felim to Silvermines uplands: The Slievefelim to Silvermines Mountain SPA as a whole covers 20,917ha and has held between seven and ten pairs of nesting Hen Harrier, and is considered one of the strongholds for Hen Harrier in the country. The SPA has a high proportion (70%) of suitable habitat. Surveys, carried out between 2016 and 2019 for the current evaluation, found that Hen Harriers nested within this SPA – no nests were recorded outside of the SPA boundary. The Mountphilips Substation is not located within the SPA; however 8km in length of the 110kV UGC passes through the SPA, entirely located within the Regional Road (R503).

Nearest Hen Harrier Nesting Sites to the development: Nests within 2km of the proposed development have been identified for this application, over a study period spanning 2017-2019 inclusive. However, a precautionary approach has been taken for completeness to include the presentation of nest data out to 3km from the development – this reflects that in certain instances the central point of observed breeding activity is often variable within a breeding season or inter-annually. For the period between 2016 and 2019, **9 No. nests were recorded within 2km, with a further 3 No. nests within 3km, and 1 No. nest at 3.2km (13 No. nests in total),** all of which were located on lands within the SPA boundary. **Four** of the seven active territories identified in 2019, **had successful nests (i.e. these were still active in July 2019** having either recently fledged young or with large chick(s) still in the nest at that time). With regard to proximity to works and therefore exposure to source impact pathways for possibly significant effects, the closest identified nest to the proposed development in any year was 0.6km away (2016), with **the closest active nest in 2019 being 0.9km away**.

No nests were recorded within 2km of the Mountphilips Substation, with the nearest nest being 4.6km from Mountphilips (in 2016).

Hen Harrier Nesting Habitat within 2km of the development: All habitats within 2km of the proposed UWF Grid Connection development (whether within the SPA or outside the SPA) were evaluated for their suitability as nesting habitat for Hen Harrier, notwithstanding whether Hen Harrier territories have been recorded within this area. 34% of the land within 2km of the development was considered to provide suitable nesting habitat for Hen Harrier, with 66% classed as unsuitable. The latter percentage includes all the lands at Mountphilips – where there is no suitable nesting habitat.

However, while there is sufficient nesting habitat to support Hen Harrier within 2km of the 110kV UGC, at closer distances to the 110kV UGC the habitats are less attractive at least to nesting Hen Harriers - within 50m of the proposed works for example, only 11.2% of all habitats are identified as suitable nesting habitat. This undoubtedly reflects the location of the 110kV UGC on primarily public road and the presence of houses and community amenities.

Hen Harrier foraging habitat within the 2km core range of identified nests: The identification of suitable foraging habitat is required to determine the likelihood of disturbance to foraging Hen Harrier, during the breeding season. The area of land suitable for foraging Hen Harrier within 2km of all nests comprise 43% of the total lands within 2km of all identified Hen Harrier nests, which is greater than the 30% of suitable foraging habitat required for an area to be attractive to Hen Harrier. Linear features comprising 255km are also present, which may offer foraging opportunities.

Hen Harrier Winter Roosting Habitat in the Study area: Suitable roosting habitats are not widely available, with only very small fragmented patches of habitat located within 2km of proposed development. No communal roost was identified within 2km of UWF Grid Connection during 2016-2018 surveys. 1 No. roost exists at 2.1km from the development, with 2 No. roosts between 3km and 3.6km. Based on desktop review, and the results of scoping and consultation with local NPWS/Hen Harrier surveyors no other roosts have been identified, within the likely zone of effect of the proposed development.

Importance of Hen Harrier: Hen Harrier is listed on Annex I of the EU Birds Directive 2009/147/EC. The breeding population of Hen Harrier is Amber listed on the most recent Birds of Conservation Concern in Ireland 2014 – 2019.

Sensitivity of Hen Harrier:

Sensitivity to Habitat Loss:

Studies have shown that most foraging takes place within 2km of the nest site, and as per SNH Guidance this is considered the core foraging range for Hen Harrier during the breeding season. The magnitude of effects is distance (to nearest nest) dependant, as both frequency of occurrence and foraging intensity descreases with distance from the nest. Of particular importance and where pathways for likely significant effects are more likely are lands which provide high quality foraging habitat within 2km of nests and on which breeding Hen Harrier (male or female birds) may be dependent during key periods of the breeding cycle such as provisioning young. Loss of suitable habitat may affect breeding success/productivity for one whole cycle, or until vegetation is re-instated both when considered alone and in combination with other possible sources of loss.

Disturbance

Hen Harriers are known to be sensitive to disturbance at the nest. An expert review of disturbance presented by Ruddock and Whitfield (2007) suggests active disturbance events during the incubation (part of breeding) period for Hen Harrier are, in the view of the majority of experts, likely to occur at <10-500m from a nest.

Whilst Foraging

There have been no specific studies examining the flight initiation distance (FID) of non-breeding Hen Harriers to human disturbance. Data collected from various other sources for disturbance effects on Falconiformes (which includes the Hen Harrier species) would conservatively suggest that foraging Hen Harriers are unlikely to be impacted by disturbance events over 150m away. As a species that disperses widely during the winter from breeding sites, Hen Harrier are less restricted to specific foraging areas (i.e. birds are not territorial) during the non-breeding season.

Sensitivity of Roosting Hen Harrier

Windfarms and associated infrastructure have not been explicitly defined as a threat or pressure on roosts within the Irish context.

Positive Sensitivity towards habitat creation or sympathetic management

Hen Harriers are positively sensitive to the creation of or sympathetic management of foraging and nesting habitat within their traditional range. Multiple studies exist where Hen Harriers have continued to nest and

forage in close proximity to operational wind energy developments where inclusive habitat 'enhancement' was provided.

Likely Impacts to Hen Harrier

The impact is evaluated as **Not Significant for Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat** due to land cover change, which will only apply at the Mountphilips Substation Site. The amount of suitable habitat loss at the Mountphilips Substation site relates to a very small area (0.05ha) of wet grassland which will permanently change to new access road. As the nearest nest is 4.6km from this suitable habitat, this habitat is considered to be sub-optimal based on distance from nest. The Not Significant significance represents a noticeable change in the character of the environment at Mountphilips, but without any significant consequences on the Annex I species Hen Harrier. The **cumulative impact is also evaluated as Not Significant**. **The impact of the Whole UWF Project will be Significant (Positive)** because the Upperchurch Hen Harrier Scheme will contribute to an overall net gain to Hen Harrier of an additional 31.8Ha of actively managed foraging habitat proximal to the SPA. The cumulative impact of the Whole UWF Project with other projects (including management plans) and activities in the area, will be **Neutral**.

The impacted is evaluated as **Not Significant for Disturbance/Displacement of foraging Hen Harrier during the breeding season** because works during the breeding season (March-August) will only take place at the Mountphilips Substation site. This means that no works will occur within 4.3km of any known nests during the breeding season and the large amount of suitable habitat (3,580ha) within the core foraging range (2km) of the Hen Harrier nests identified; the availability of suitable foraging habitat within the wider area, with 70% suitable habitat available within the SPA; in the context of existing background trends, disturbance is primarily related to visual intrusion, and Hen Harrier is likely to already be habituated to road-based and farming-based noise and visual intrusion; effects will be momentary-brief in duration; unlikely to affect any individual >150m from source, and; highly reversible once any individual moves beyond 150m. The **cumulative impact is also evaluated as Not Significant**. **The impact of the Whole UWF Project will be Not Significant.** The cumulative impact of the Whole UWF Project with other projects and activities in the area, will be **Not Significant to Slight**.

The impact is evaluated as **Not Significant for Disturbance/Displacement of foraging Hen Harrier outside of the breeding season** because birds will already be habituated to road-based noise and visual intrusion; effects will be momentary-brief in duration; unlikely to affect any individual >150m from source; and highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available. Disturbance to birds at their night-time roosts, has been excluded as no significant effects are reasonably foreseeable due to distance between UWF Grid Connection works and identified roost sites. The **cumulative impact is also evaluated as Not Significant**.

The Impact is evaluated as **Imperceptible for Reduction in Prey Item Species** because a potential reduction in prey item availability only relates to the Mountphilips Substation Site, where suitable foraging habitat comprising 0.05ha will be lost, which is evaluated as negligible in the context of the separation distance to the nearest hen harrier nest (greater than 4km). There will be no noticeable changes in the character of the environment from a prey availability perspective. The **cumulative impact is also evaluated as Imperceptible**. **The impact of the Whole UWF Project will be Moderate (Positive)** because of the positive effect on prey item species of the Upperchurch Windfarm Hen Harrier Scheme. The cumulative impact of the Whole UWF Project with other projects (including management plans) and activities in the area, will be **Neutral**.

Summary of Likely Impact on General Bird Species

The species recorded during the two breeding season surveys at the Mountphilips substation site and the April 2019 survey along the entire length of the proposed 110kV UGC route are all representative of common and widespread terrestrial breeding bird communities in Ireland, being typical of the mosaic of farmland, woodland and rural gardens found in the survey areas.

The Impact is evaluated as **Not Significant** (Meadow Pipit: Habitat Loss); **Imperceptible** (Golden Plover: Habitat Loss); **Not Significant** (Golden Plover – Disturbance/Displacement); **Imperceptible** (Kingfisher, Grey Wagtail and Dipper - Disturbance/Displacement); and **Slight Positive** (General Birds - Habitat Enhancement). This is because of the negligible loss of suitable nesting habitat and the extent of suitable foraging habitat to be affected (1.75Ha), evaluated as very low, in the context of the availability of suitable habitat in the surrounding area – for Meadow Pipit at the Mountphilips Substation Site); because no Golden Plover were recorded at the Mountphilips Substation during any ecological surveys between 2016 and 2019. Activities such as cable trenching will not contrast significantly from baseline activities such as road works or farming related works; because of the low and negligible Sensitivity and Magnitude respectively of disturbance effects; the implementation of Project Design Measures for Grey Wagtail and Dipper; the duration of any individual disturbance events will be brief and reversible once works finish, with birds expected to return; and because of the benefit to bird diversity of the planting of hedgerows, erection of nest boxes and reinstatement built into the design. The cumulative impact is evaluated in the range from **No Cumulative Impact to Imperceptible to Not Significant**. The impact of the Whole UWF Project will range from **Imperceptible to Slight to Not Significant to Slight (Positive).**

Summary of Likely Impact on Bats

The key sensitivities of bats are the **destruction or disturbance of their roosting places**, and the **modification of their commuting routes and foraging habitats**.

Destruction or disturbance of bat roosts in trees due to removal of mature trees, trimming and pruning of mature trees and hedgerows at Mountphilips Substation Site. **The Impact is evaluated as Imperceptible** because only 1 tree of moderate suitability is within the zone of effect. A number of project design measures will ensure that no bats are roosting in the tree at the time of works. The other trees near the Mountphilips Substation, 1 tree has moderation suitability and the rest have low suitability for bats. **Destruction / disturbance of bat roosts in bridges** due to trenching works for the 110kV UGC, and works to parapet walls. The 110kV UGC will cross a number of bridges and culverts, all within the existing road foundations. **The Impact is evaluated as Imperceptible because** two bat roosts could be directly or indirectly affected, both of which are of Negligible Importance; and the application of project design measures include bridge surveys (and the exclusion of bats, if required) before works over a bridge commences. **Severance of commuting routes or feeding areas** due to site clearance works particularly along the route of the new access road to Mountphilips Substation. **The Impact is evaluated as Imperceptible** because only a small extent of hedgerow will be permanently lost, and; 700m of additional hedgerow planting will more than compensate for its loss. **Disturbance or Displacement due to Lighting** which will be required for security reasons at the temporary construction compound. **The Impact is evaluated as Imperceptible** because the use of cowling will prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition and any lighting that is required would only be temporarily active, and would not be on throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration. There will be **No Cumulative Impact with Other Elements of the Whole UWF Project** due to separation distance. The cumulative effect of the **Whole Windfarm Project will range from Imperceptible to Not Significant** because of the small extent of the combined works that will affect Bats.

Summary of likely Impact on Non-Volant Mammals

Baseline surveys recorded evidence of **Otter, Badger, Fox, Deer species, Rat and Squirrel species** within the study area, however limited evidence of breeding or resting sites is present, primarily due to the placement of the majority of work locations within the public road. No active breeding or resting sites for Badger (setts) or Otter (couches and/or holts) are present within the Study Area. At the Mountphilips Substation site evidence of Badger, Squirrel, Deer and Fox were recorded. No Badger setts were recorded at the Mountphilips Substation site. Along the 110kV UGC route outside of the Mountphilips Substation site, evidence of mammals is limited to 18 mammal pathways/mammal runs, which is typical evidence of roadside usage. A total of seven burrows were recorded within 50 metres of the 110kV UGC route. Three of these burrows were inactive or infrequently used. The species using these burrows could not be confirmed due to an absence of other confirmatory evidence i.e scat, hairs, or prints, however they are considered likely to be Rabbit or Rat. No protected sites in respect of Badger and other general mammals exist within the study area. All mammals are sensitive to the direct effects from disturbance/displacement from breeding and foraging ranges as a result of habitat loss, construction noise and visual intrusion.

Otter - Disturbance/Displacement due to construction noise and visual intrusion. **The Impact is evaluated as Slight** because there is recorded Otter evidence in close proximity to three identified crossings, in particular at one location where parapet works will take place over the Lower River Shannon SAC, however; no Holts or resting places occur in close proximity, and; works will take place during daylight hours, and from the surface of the bridge only, with; very slight contrast to existing baseline conditions is expected, given the majority of works take place in an existing road subject to heavy passage of traffic, to which Otter will be habituated; the brief-temporary duration of disturbance events and any corresponding effect, with effects expected to be reversible, and; project design measures to avoid/reduce effects also in place, including at all watercourse crossing locations. **Badger – Habitat Loss** where the potential for effects is limited to the Mountphilips Substation site. While no evidence of Badger activity was recorded during the 2019 survey, suitable foraging habitats, consisting of grassland, woodland and hedgerows were recorded within 50m of the substation, considering the widespread distribution of Badger in Ireland, and the presence of suitable foraging habitat within and in close proximity to the study area, Badger are considered likely to forage in the area. The **Impact is evaluated as Not Significant** because no setts were recorded within the study area. While badgers' cross roads to access feeding areas, they generally do not forage along roads, and are particularly unlikely to forage along a road as busy as the R503; the brief duration of the works and the absence of significant habitat loss associated with the area; the extent of land use change, within the context (less than 2%) of an average territory size of 80Ha, and; very slight contrast with baseline conditions. **Badger – Disturbance and Displacement**, the **Impact is evaluated as Imperceptible** because of the absence of badger setts within 50m of the works; temporary duration of the works; completion of works during daylight hours; the majority of the works will be confined to the existing public road, with all works for the 110kV UGC carried out from paved surfaces only, and; effects are unlikely to cause noticeable changes in the character of the environment. The cumulative impact is evaluated in the range from **No Cumulative Impact to Imperceptible**. The **Cumulative Impact of the Whole UWF Project will range from Slight to Not Significant** because of the absence of activity in the cumulative area and protection measures built into the design of the projects.

Summary of the Likely Impact on Amphibians & Reptiles

Taking into account the species distribution of amphibians and reptiles in Ireland, **suitable habitat exists within the study area for Smooth Newt, Common Frog,** and **Common Lizard**. Amphibians and reptiles are sensitive to direct mortality, habitat loss, habitat fragmentation and disturbance and to the emergence of previously unrecorded diseases. **No Impacts were included for further evaluation** because suitable habitat degradation is considered to be unlikely; the extent of reduction in foraging and breeding habitat is considered negligible, in the context of availability of habitats in the immediate surrounding area. Disturbance/Displacement effects are considered to be neutral because the spatial extent, limited frequency, and brief duration of the works will be negligible and identified suitable habitats do not overlap construction works areas or activity locations. There is **No Potential for Cumulative Impacts** because the impacts from any individual element will be Neutral.

Summary of the Likely Impact on Marsh Fritillary

No suitable habitat for Marsh Fritillary was recorded on or adjacent to the lands at Mountphilips Substation site. Outside of the Substation site, the 110kV UGC is located entirely in the paved surfaces of roads which are not suitable habitat for Marsh Fritillary butterfly. During 2017 surveys for Other Elements of the Whole UWF Project, three colonies of Marsh Fritillary were recorded, with two c. 1.2km north of the 110kV UGC route and one c.1.1km south east of the works at the Consented UWF Substation at Knockcurraghbola Commons. **The impact of Habitat Loss** through excavation works for UWF Grid Connection **is therefore evaluated as No Likely Impact**. **There is No Likely cumulative impact** because there was no Marsh Fritillary habitat identified within 50m of the overlap areas with the other elements of the Whole UWF Project. The cumulative effect of the **Whole UWF Project will be Slight,** and only relates to the UWF Related Works and Upperchurch Windfarm in Shevry, the **cumulative Impact of the Whole UWF Project with peat extraction activities at Cummer Bog** is evaluated as **Moderate** because of the small overall extent and degree of Habitat loss and the likely continuance of peat extraction at the nearest known colony within the study zone.

Summary of the Overall Impact on Biodiversity

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

Relevant ecosystems within the study area of the proposed development, including terrestrial and aquatic habitats, along with their respective individual receptors scoped in for appraisal have been subject to full consideration in this chapter and the resultant conclusion is that with the implementation of the mitigation and project design as outlined herein, no residual effects remain. No significant impacts on the interaction, variety or variability within species comprising terrestrial and aquatic ecosystems or European Sites comprising parts of their ecosystem functioning are anticipated.

8 Environmental Factor: Biodiversity

8.1 Introduction to the Biodiversity Chapter

8.1.1 What is Biodiversity?

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

8.1.2 Overview of Biodiversity in the Local Environment

The proposed Mountphilips Substation is on agricultural grassland, located on lower lying land to the west of the Slievefelim to Silvermines upland area. Outside the Mountphilips Substation site, the proposed 110kV UGC will cross through the Slievefelim to Silvermines uplands entirely under paved roads – predominately the Regional Limerick to Thurles Road (R503), in order to connect said Mountphilips Substation to the Consented Upperchurch Windfarm Substation to the east of the uplands. Due to the location of the 110kV UGC wholly within paved roads, the immediate vicinity of the 110kV UGC is dominated by agricultural grassland and other habitats reflective of this e.g. roadside hedgerows, treelines and earth banks, with numerous dwellings, farm buildings and associated gardens, amenity grassland, hedges and lawns. The wider surrounding environment is representative of typical upland habitats, and includes lands under active management for agriculture and forestry. Birds, bats and other mammals, amphibians, reptiles and invertebrates are present within the upland area.

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 and include the Killeengarriff, Newport (Tipperary) and the Bilboa sub-catchments. Within the River Suir catchment, the remaining c.1.5km of the 110kV UGC route is located within the Suir sub catchment. Otter, fish and other aquatic species are present within these sub-catchments.

European Sites such as the Slievefelim to Silvermines Mountains SPA and the Lower River Shannon SAC are found in the surrounding area. The 110kV UGC passes through the boundary of the Slievefelim to Silvermines Mountains SPA for 8km, along the R503. The SPA is designated for the protection of Hen Harrier. The 110kV UGC overlaps the boundary of the Lower River Shannon at 6 No. locations on the public road, mainly along the Regional Road (R503). The SAC is designated for the protection of aquatic habitats, and salmonids and freshwater aquatic species. Other European Sites, including the Lower River Suir SAC and the Clare Glen SAC, along with nationally designated NHAs and pNHAs are also found within the surrounding area.

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

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

8.1.3 Sensitive Aspects of the Biodiversity environment included for further evaluation

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

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

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

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

8.1.4 Sensitive Aspects excluded from further evaluation

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

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

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

8.1.5 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 8-1 below.

Table 8-1: Subject Development – UWF Grid Connection

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

8.1.5.1 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.

8.1.6 The Authors of the Biodiversity Chapter

The Biodiversity chapter was prepared by Inis Environmental Consultancy team members who are scientific experts in various fields of ecology and biodiversity. The team members were;

Howard Williams BSc CEnv MCIEEM CBiol MRSB MIFM (Principal Ecologist and CEO Inis Environmental Consultancy) - Howard is a Chartered Environmentalist and a Chartered Biologist and has written and managed many Construction Environmental Management Plans, Article 6 Appropriate Assessments and Ecological Impact Assessments for over 50 wind farm projects. Howard is an expert in the field of avian ecology in addition to having considerable knowledge and experience producing management strategies/prescriptions for a range of protected species, both terrestrial and aquatic.

Christopher Cullen Dip. Eng. Dip. Ecol. ACIEEM (Senior Ecologist) – Chris is a specialist in Ornithological surveys and assessments, however, he also has experience in Project Management, Appropriate Assessment, Expert Witness testimony, Cumulative Impact Assessment, Habitat Mapping, Mitigation Development, EIA, Collision Risk Modelling, Biomonitoring and a broad range of survey methodologies;

Dr. Alex Copland BSc PhD - experienced conservation scientist, specialising in the conservation of wild birds and biodiversity in the wider countryside, particularly in agricultural, upland and peatland landscapes. He is proficient in data analysis and studied bird populations in Ireland for over 18 years. He has managed several large-scale, multi-disciplinary conservation projects, including research and conservation work for species of conservation concern. He has worked with NGOs at EU-level as well as EU institutions (European Commission and European Parliament);

Jennifer Pearson BA MSc ACIEEM – Ecologist. Jennifer has worked as an Environmental Clerk of Works on multiple wind farms in England and Wales in terrestrial environments, and has been involved in EIA and AA evaluations for large wind farms and grid connection infrastructure.

Donncha Ó Catháin BSc (Hons) MSc GCIEEM – Ecologist. Donncha has a broad range of expertise within the Ecology sector, including aquatic ecology, botany and habitat assessment, and expertise in undertaking Ecological Clerk of Works. He has experience of using a range of survey techniques; such as habitat surveys using Fossitt (2000) classification, breeding bird surveys, winter bird transects and vantage point surveys, in line with Best Practice;

Peter O Connor MSc. Qualifying member of CIEEM - Peter holds a Masters Degree in GIS and Remote Sensing. He has experience in using MaxEnt and LiDAR to map the habitat suitability and distribution of bird species;

Gyr Penn Bird Surveyor –Having previously worked for the RSPB as a species protection officer over many years Gyr is considered by his peers in Ireland to be a highly skilled hen harrier surveyor. He has Hen Harrier survey experience at all levels of wind farm development (pre, during and post-construction periods including clear-felling) within SPAs (Slieve Aughty Mountains SPA, Co. Galway and the Slievefelim to Silvermines Mountains SPA, Co. Tipperary). He has worked for Inis at a number of wind farms carrying out vantage point surveys for Hen Harriers within SPAs;

Timothy Gallagher - Ecologist/ Mammologist. Timothy is a Field Ecologist and has conducted numerous surveys using various standardised techniques and methods including vantage point watches, CBS transects, small mammal trapping surveys, ink-pad tunnel trapping surveys, remote camera trapping surveys and large-scale mammal transect surveys.

Daireann McDonnell, MSc, B.Sc. Daireann is a qualified and experienced Aquatic Ecologist with more than fifteen years of professional experience in the environmental sector. He has provided specialist input in the delivery of Ecological Impact Assessments and Appropriate Assessment reporting for plans and projects potentially affecting terrestrial, freshwater and marine resources. He has extensive experience in aquatic surveys for protected and sensitive species, including invertebrate identification / biological water quality

assessments. Daireann is certified to undertake Freshwater pearl mussel (Margeritifera margaritifera) surveys by the NPWS; and has held licenses for this species, as well as for White-clawed crayfish (Austropotamobius pallipes). He has completed numerous riparian corridor and fisheries surveys and assessments. Daireann also has significant experience in habitat survey and assessment, in addition to a range of terrestrial flora and fauna (mammals, birds and invertebrates) surveys.

Nick Marchant, has twelve years of professional experience, including nine years as an ecological consultant, one year as a local authority biodiversity officer, and two years managing an NGO overseas. He has an MSc in Ecosystem Conservation and Landscape Management from NUI Galway and a BSc in Environmental Science from Queens University Belfast. He is a member of the Chartered Institute of Ecology and Environmental Management, and operates in accordance with their code of professional conduct.

8.1.7 Sources of Baseline Information

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

Table 8-2: Sources of Baseline Information for Biodiversity

Type	Source
Consultation	Feedback was received from • An Bord Pleanála pre-application consultation • Tipperary County Council pre-application consultation • National Parks and Wildlife Service • Inland Fisheries Ireland See Chapter 3: The Scoping Consultations, and Appendices A3.1, A3.2.
Policy & Legislation	• National Biodiversity Action Plan (2017 – 2021) • North Tipperary County Development Plan 2010 (as varied), adopted in December 2015, relevant provisions include HERT29 • Draft North Tipperary Local Biodiversity Action Plan 2007 • Mid-West Regional Planning Guidelines 2010-2022 • North Tipperary Heritage Plan 2013-2018 • Tipperary Renewable Energy Strategy 2016 • South Tipperary Biodiversity Action Plan 2010-2015 • EU Birds Directive (2009) Directive 2009/147/EC • EU Habitats Directive (1992) Council Directive 92/43/EEC • EC (Birds and Natural Habitats) Regulations 2011 (as amended) • Water Framework Directive (2000) Directive 2000/60/EC
Guidelines	<u>Ecological Evaluation</u> • National Roads Authority, (2008) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. • Guidelines for Ecological Impact Assessment in the UK and Ireland- (CIEEM, 2016 and 2018). • Environment Agency, (2014) UK Pollution Prevention Guidelines (PPG) • EPA (2017) Guidelines on the Information to be contained in EIA Reports, Draft. <u>Hen Harrier</u> • Arroyo *et al*. (2009) Hunting habitat selection by hen harriers on moorland: Implications for conservation management. • Arroyo et al. (2014) Ranging behaviour of Hen Harriers breeding in Special Protection Areas in Scotland. • Barton et al. (2006) The second national survey of breeding hen harriers in Ireland 2005 • Forrest *et al*. (2011) Flight activity and breeding success of hen harrier at Paul's Hill Wind Farm in Scotland. • Hen Harrier Project, (2019). HARRIER HEN PROGRAMME T&Cs 2nd Edition April 2019. Note 6, Pg. 22. • Irwin *et al.* (2012) Optimum scenarios for Hen Harrier conservation in Ireland. Report to the Dept. of Agriculture, Food & the Marine. • Madders, M. (2000) Habitat selection and foraging success of Hen Harriers Circus in west Scotland. • Madders, M. (2003) Hen Harrier foraging activity in relation to habitat and prey. • Moran & Wilson-Parr, (2014), Hen Harrier SPA Mapping Project undertaken by NPWS

Type	Source
	• NPWS (2015) Hen Harrier Conservation and the Forestry Sector in Ireland Version 3.2 • Hardey *et al.* (2014). Raptors: a field guide to survey and monitoring (3rd Edition) • O'Donoghue, 2010 Irish Winter Hen Harrier Roost Survey (IWHHRS) • Ruddock *et al*. (2007). A review of disturbance distances in selected bird species. Natural Research (Projects) Ltd to SNH • Ruddock *et al* (2012) Republic of Ireland National Hen Harrier Survey 2010. Irish Wildlife Manual, No. 59, NPWS • Ruddock *et al.* (2016) 2015 National Survey of Breeding Hen Harrier in Ireland. Irish Wildlife Manuals, No. 93 NPWS and Scottish Natural Heritage (SNH). • Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind Farms. Version 2. SNH, Battleby. <u>Other Birds</u> • Birdwatch Ireland (2010) An assessment of the effects of Arterial Drainage Maintenance on Kingfisher and other riparian birds. • Birdwatch Ireland (2012) Guidelines for Countryside Bird Survey Participants • Colhoun et al (2013) Birds of Conservation Concern in Ireland 2014-2019. • Cummins *et al.* (2010) Assessment of the distribution and abundance of Kingfisher and other riparian birds on six SAC river systems in Ireland Birdwatch Ireland • Crowe et al.(2014) Countryside Bird Survey Report 1998-2013, BirdWatch Ireland • Lusby *et al.* (2011) Assessing the effectiveness of monitoring methods for Merlin in Ireland: the Pilot Merlin Survey 2010. • Bibby *et al.* (2000). Bird Census Techniques, 2nd Edition. Academic Press, London. • Cummins *et al.* (2010) The status of Red Grouse in Ireland and the effects of land use, habitat and habitat quality on their distribution. Irish Wildlife Manuals, No. 50. NPWS <u>Terrestrial Habitats</u> • Fossitt, J (2000) A Guide to the Habitats of Ireland • Smith *et al.* (2011) Best Practice Guidance for Habitat Survey and Mapping, Heritage Council Ireland • Irish Statute Book (Various) European Communities (Natural Habitats) Regulations 1997 (S.I. 94/97) as amended • NPWS (2013) Status of Protected EU Habitats and Species in Ireland. Overview Vol.1. <u>Bats</u> • Collins (2016) Bat Conservation Trust: Bat surveys for professional ecologists: good practice guidelines • Billington *et al.* (1997). The Conservation of Bats in Bridges Project. Natural England. • Collins (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Ed.) • National Road Authority (2006) Guidelines for the treatment of bats during the construction of National Road scheme. • Lundy *et al.* (2011) Landscape conservation for Irish bats & species specific roosting characteristics, Bat Conservation Ireland. <u>Badgers</u> • NRA, 2005 Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes • Sleeman *et al.* (2009) How many Eurasian badgers are there in Ireland?, European Journal of Wildlife Research <u>Otters</u>

Type	Source
	• National Roads Authority (2006) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes • Highways Agency (1999) The Good Roads Guide: Nature Conservation Advice in Relation to Otters *Design Manual for roads and Bridges* (DMRB Vol 10 S. 4 Part 4 HA 81/99). <u>Aquatic Habitats & Species</u> • National Roads Authority (2005) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. • Inland Fisheries Ireland, (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters • Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board, not dated). • CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' • CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors). • Fowles & Smith, (2006) Mapping the habitat quality of patch networks for the marsh fritillary • Meehan, (2013) National Smooth Newt Survey 2013 Report, Irish Wildlife Trust, • National Biodiversity Data Centre (2016) Data for records of Common Frog held by NDBC <u>Invasive Species</u> • Kelly *et al.* (2013a) The economic cost of invasive and non-native species in Ireland and Northern Ireland, A report prepared for the N.I. Environment Agency and NPWS. • Kelly, *et al.* (2013b) Risk analysis and prioritisation for invasive and non-native species in Ireland and Northern Ireland, A report prepared for the N.I. Environment Agency and NPWS. • O'Flynn *et al.* (2014) Ireland's invasive and non-native species – trends in introductions, NBDC Series No. 2.
Desktop	• NPWS website www.npws.ie • National Biodiversity Data Centre website(NBDC) www.biodiversityireland.ie • Tipperary County Council www.tipperarycoco.ie • Transport Infrastructure Ireland (formerly NRA) www.tii.ie • European Union www.europa.eu • Water Framework Directive www.wfireland.ie • Scottish National Heritage www.nature.scot • The Heritage Council www.heritagecouncil.ie • Construction Industry Research and Information Association www.ciria.org • Irish Wildlife Trust www.iwt.ie • Environmental Protection Agency website (EPA) www.epa.ie • Inland Fisheries Ireland (IFI) www.fisheriesireland.ie • Birdwatch Ireland (BWI) www.birdwatchireland.ie • Bat Conservation Ireland (BCI) www.batconservationireland.org • Butterfly Ireland www.butterflyconservation.ie <u>Previous Hen Harrier Surveys</u> • Results of Hen Harrier surveys performed from March 2015 to April 2017 were used as a source of information. These surveys focused on suitable nesting habitat and historical nest locations within 2km of the UWF Related Works/Upperchurch Windfarm sites. • Existing records of Hen Harrier usage of the area, dating back to 2003, were collated to establish suitable nesting or roosting habitat and further consultation undertaken in January 2019 with local Hen Harrier experts and NPWS.

Type	Source
	• Satellite imagery was reviewed to identify areas of potentially suitable breeding habitat. In co-ordination with and/or by review of the other EIA Report Chapters as follows: • Chapter 7: Land • Chapter 10: Soils • Chapter 11: Water • Chapter 12: Air • Chapter 15: Material Assets (Roads) • 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 Milestone Windfarm, Rearcross Quarry, Newport Town Park, Castlewaller Windfarm (consented windfarm) Bunkimalta Windfarm (potential windfarm based on previously proposed windfarm). Planning Reference numbers included in Appendix 2.1.
Fieldwork	Field Walking • The locations of UWF Grid Connection (Mountphilips Substation site and the route of the 110kV UGC) were visited, and watercourses surveyed, in January 2019 and May 2019. Habitat Surveys • All terrestrial habitats within a 50m buffer of work locations were surveyed and classified, in January and May 2019, see also Appendix 8.3. • Aquatic Ecology/Fisheries: A watercourse characteristics survey of the 68 No. crossing locations of the UWF Grid Connection was carried out on the 17th, 22nd, 23rd and 28th of January 2019 and May 2019. Some additional watercourse crossing locations were surveyed in June of 2019. Surveys of watercourse crossing locations located on haulage routes associated with the UWF Grid Connection were carried out on the 7th and 8th June, 2017, see also Appendix 8.2. Species specific surveys • Hen Harrier: Hen Harrier surveys were carried out in April, June and July 2019. 10 No. vantage points were selected which focused on suitable nesting habitat and historical nest and roost locations (identified since 2003) within 2km of the UWF Grid Connection construction works boundary (whether within the SPA or outside the SPA). Surveys were carried out to identify breeding behaviour (in April 2019) and active nests (in June and July 2019). In order to determine the availability of nesting and foraging habitats for Hen Harriers within 2km of each identified nest location, satellite imagery was examined and ground-truthing was carried out in May 2019. Habitat and prey item presence surveys within 150m of the construction works areas were also carried out in May 2019. Winter Roost Surveys were undertaken for the 2018 EIAR in Sept 2016 to Feb 2017 and Sept 2017 to Feb 2018. Up to date details of roost sites and activiites was subject of informal consultation with local Hen Harrier experts and the NPWS, see also Appendix 8.4 and Appendix 8.5. • General Birds: A standardised bird transect survey was undertaken at the Mountphilips Substation site in the breeding seasons of 2016 and 2017 and non-breading seasons of 2016/ 2017 and 2017/2018 and a similar transect methodology was also used to survey the proposed Mountphilips Substation and the whole length of proposed 110kV UGC route over seven days in April 2019 (breading season 2019), see also Appendix 8.3. • Kingfisher: Watercourse crossings were evaluated for any evidence of Kingfisher nest holes within 300m, both upstream and downstream, of 26 No. crossing locations (in tandem with Otter surveys in January and May 2019), see also Appendix 8.7. Kingfisher surveys extending to 500m

Type	Source
	upstream and downstream of W7 Newport River crossing point were undertaken in June 2019 as this location had potential to support suitable Kingfisher foraging and nesting habitats, and with potential for greater prey item availability, see also Appendix 8.7. • Barn Owls: In February 2019, buildings were noted for potential suitability for Breeding Barn Owls. In August 2019, four buildings identified as having high suitability for Barn Owls were surveyed, see also Appendix 8.7. • Bats: Bat surveys were conducted in January 2019. Buildings within 50m of the 110kV UGC, were appraised for their suitability for roosting bats, (there are no buildings within 50m of Mountphilips Substation). Mature trees with bat roost suitability within 50m of the UWF Grid Connection construction works area, were inspected from ground level. The 110kV UGC will be installed over/under c. 65 watercourse crossing structures (i.e. bridges and culverts) and all of these were inspected and subjected to emergence or re-entry surveys in some instances, in May of 2019. Bat Activity Surveys using automated detectors were carried out at four locations near the Mountphilips Substation site and two locations near the consented Upperchurch Windfarm substation in the mid-summer and autumn seasons of 2016, see also Appendix 8.9. • Non-Volant Mammals: The surveys of non-volant mammals, to inform the first planning application (partially relied on herein) were undertaken in March, 2016, August 2016, September 2016 and April 2017. Updated surveys of non-volant mammals (including badger in particular) present within 50m of the proposed works (for the *currently proposed* 110kV UGC route) were completed in January and May 2019, see also Appendix 8.8. The revised footprint of the Mountphilips Substation site was also re-surveyed for signs of mammal evidence in July of 2019. • Otter: surveys of suitable watercourses were carried out in January and May 2019, where a total of 26 watercourses were surveyed, the watercourses were surveyed within 300m upstream and downstream of the crossing point of the 110kV UGC over/under the existing watercourse crossing structure and include the Newport River (W7), Clare River (W36) and Bilboa River (53) and 23 other watercourses (W5, W8, W9, W18, W21, W22, W23, W26, W28, W29, W30, W33, W35, W39, W41, W42, W46, W47, W48, W49, W50, W51 and W52). • Amphibians and Reptiles occurring within the study area were recorded during the course of all site walkovers for habitat, mammal and bird surveys in January 2019 and in May 2019. Surveys were undertaken in May 2019, along the section of route bypassing Newport town where suitable habitat for Smooth Newt and Common or Viviparous Lizard was noted, see also Appendix 8.8.

8.1.8 Methodology used to Describe the Baseline Environment and to Evaluating Effects

A combination of NRA guidance[2] and methodology developed by Steve Percival[3] was used to evaluate the sensitivity of ecological receptors, the magnitude of impacts and the resultant significance of likely or potential effects to relevant aspects of Biodiversity as a result of the development of the UWF Grid Connection.

8.1.8.1 Determining the Importance of the Biodiversity resources (NRA 2009)

The importance of biodiversity resources within the study areas for UWF Grid Connection has been derived from NRA Guidance (2009), as outlined in the table below.

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

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

[2] Guidelines for Assessment of Ecological Impacts of National Road Schemes, 2009
[3] Predicting the effects of wind farms on birds in the UK: the development of an objective assessment method, 2007

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

8.1.8.2 Determining the Sensitivity of Biodiversity Receptors

Guidance from Percival 2007 and NRA 2009 has been used to evaluate the sensitive of bird species to the proposed development. This rating system has also been used as a general guide for other biodiversity receptors throughout this report.

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

Sensitivity of Bird receptor	Percival 2007 criteria	NRA Resource Evaluation	NRA Criteria	Combined Criteria
Very High	Species is cited interest of SPA. Species present in Internationally important numbers.	International Importance.	Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive	Species is cited interest of SPA. Species present in Internationally important numbers. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive
High	Other non-cited species which contribute to integrity of SPA. Ecologically sensitive species (<300 breeding pairs in UK) and less common birds of prey. Species listed on Annex 1 of the EU bird's directive. Regularly occurring relevant migratory species which are rare or vulnerable	National Importance	Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list	Other non-cited species which contribute to integrity of SPA Ecologically sensitive species (<300 breeding pairs nationally) and less common birds of prey. Species listed on Annex 1 of the EU bird's directive. Regularly occurring relevant migratory species which are rare or vulnerable Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list (in this case BOCCI Red list).
Medium	Species present in regionally important numbers (>1% of regional population). Species occurring within SPA's but not crucial to the integrity of the site. Species listed as priority species in the UK BAP subject to special conservation measures	County Importance	Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; County important populations of species. Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.	Species present in regionally important numbers (>1% of regional population). Species occurring within SPA's but not crucial to the integrity of the site. Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; County important populations of species. Species that are rare or are undergoing a decline in quality or extent at a national level.

Sensitivity of Bird receptor	Percival 2007 criteria	NRA Resource Evaluation	NRA Criteria	Combined Criteria
Low	Species covered above which are present very infrequently or in very low numbers. Any other species of conservation interest not covered above, e.g. species listed on the red or amber lists of the BoCCI.	Local Importance (High Value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.	Locally important populations of priority species identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Amber listed species.
Negligible	Species that remain common and widespread	Local Importance (Low Value)	n/a	Species that remain common and widespread Green Listed Species.

8.1.8.3 Determining Magnitude of Impacts to Biodiversity Receptors (Percival 2007)

A definition of terms used in respect of magnitude for bird species evaluations is outlined in the table below. This rating system has also been used as a general guide for magnitude quantification for other biodiversity receptors throughout this report.

Table 8-5: Determining Magnitude of Impacts (Percival 2007)

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

8.1.8.4 Determining Risk of Effect to Biodiversity Receptors (Percival 2007)

The guideline probability rating definitions used to inform bird species evaluations in conjunction with the probability definitions as outlined in Table 8-7 are outlined in the Table 8-6 below. In some instances, consideration of a species sensitivity and or separation distance has merited an evaluation of less than LOW in respect of the probability of impacts, this is referenced in the text where applicable.

This rating system has also been used as a general guide for determining risk in relation to other biodiversity receptors throughout this report.

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

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

The EPA also define the probability of effects, in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, August 2017), as outlined in the table below.

Table 8-7: Probability of Effects (EPA, August 2017)

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

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

The Percival significance matrix used for bird species evaluations is provided in the table below. This matrix has also been used as a guide for determining the significance of impacts in relation to other biodiversity receptors throughout this report. The Equivalent EPA significance ratings have been applied to the table by the authors.

Table 8-8: Determining the Significance of Impacts (Percival 2007 with equivalent EPA Significance Ratings)

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

Inis Environmental Note: 'Very Low' significance (as per Percival 2007) is considered equivalent to the EPA definitions for 'Not Significant', or 'Imperceptible' or 'Neutral' depending on the context of the magnitude of the impact or the sensitivity of the receptor, determined by the authors based on their professional ecological judgement and experience. Similarly, the significance of impacts where the magnitude is Negligible is

determined by the authors based on the context of the impact and their professional ecological judgement and experience.

8.1.8.6 EPA EIAR Guidance Definitions of Effects

Table 8-9 to 8-11 outline the EPA evaluation criteria utilised in this appraisal of the Environmental Factor, Biodiversity. This criteria is included in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, August 2017)

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

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

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

Duration of Effect	Description
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day
Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years
Medium-term Effects	Effects lasting seven to fifteen years
Long-term Effects	Effects lasting fifteen to sixty years
Permanent Effects	Effects lasting over sixty years

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

Significance of Effect	Description
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

8.1.8.7 Desktop Review

8.1.8.7.1 Designated Sites and Protected Species

A desktop review was conducted to inform scoping and identify features of ecological importance. The desktop review also included an appraisal of all sites designated for nature conservation under national and international legislation within a 15km radius of the UWF Grid Connection and the Whole UWF Project. Potential sites of conservation interest were identified by an examination of Ordnance Survey (OSI) mapping (1:50,000 scale), NPWS maps browser and detailed aerial photography (Bing maps).

Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs) within 15km, and records of protected species in the vicinity of UWF Grid Connection and Whole UWF Project were identified. This information was obtained by accessing the website of the National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government.

A data request was also sent to NPWS GIS division on 01/08/19 for a full inventory of all protected and rare species recorded within pertinent 10km squares overlapping the UWF Grid Connection and Whole UWF Project. This data is presented in Table 1 in Appendix 8.1: Species Records held by NPWS & NBDC, Volume C4: EIAR Appendices.

The database of the National Biodiversity Data Centre was also consulted to assess the presence of rare plant and faunal species and records of protected species reported within the primary 10km squares in which the UWF Grid Connection and Whole UWF Project is located. This data is presented in Tables 2 to 8 in Appendix 8.1: Species Records held by NPWS & NBDC.

Due to the conditions of the data request with regard to the presentation of sensitive data as defined (https://www.npws.ie/sites/default/files/general/npws-sensitive-species.pdf), not all records are presented. In addition, the spatial resolution of each record is presented at 10 km scale in line with the condition that "data are provided on the understanding that users will not use the information to the detriment of individual species or habitats, biodiversity or the environment in general."

8.1.8.7.2 Hen Harrier – Desktop Review

Existing records of Hen Harrier usage of the area, dating back to 2003, were collated to establish suitable nesting or roosting habitat and satellite imagery was additionally reviewed to identify areas of potentially suitable breeding habitat. NPWS Conservation Rangers and local bird experts with knowledge of existing and historical Hen Harrier nest record locations were consulted for current information.

By virtue of the prior appraisal of Upperchurch Windfarm and UWF Related Works, breeding occupancy and presence of winter roosts has already been established for those areas of habitat within and proximal to these other Elements of the Whole UWF Project.

8.1.8.7.3 Bats – Desktop review

National landscape suitability maps for Irish bat species (Lundy et al., 2010) were reviewed using the Map Viewer of the National Biodiversity Data Centre. See Plate 1 in Appendix 8.5: Bat & Non-Volant Mammals Data. Records of known bat roosts within 10km of the UWF Grid Connection were obtained from the Bat Conservation Ireland database at the outset of the project.

8.1.8.7.4 Aquatic Ecology – Desktop Review

A comprehensive desktop review was carried out to identify watercourses along the UWF Grid Connection location. Information on water quality of the relevant watercourses was obtained from the EPA website and Chapter 11 Water.

8.1.8.7.5 Review of Previous Fieldwork

Site investigations carried out between December 2015 and May 2018 for the 1st (2018) UWF Grid Connection planning application at the location of Mountphilips Substation and the western and eastern extents of the 110kV UGC, are relevant to this 2nd (2019) UWF Grid Connection (*in which generally only the route of the 110kV UGC between Mountphilips Substation and Upperchurch Windfarm Substation has changed, the location of Mountphilips Substation remains the same, although the 2019 substation compound is larger in size than that proposed in 2018*). Findings from this fieldwork were therefore used to inform the evaluations in this 2nd Application also.

8.1.8.8 Fieldwork Methodology - Hen Harrier

Following scoping and formal consultation with NPWS as described in Chapter 3 of the EIAR, it was established that, based on likely sensitivities, and source-pathways linkages in respect of disturbance and displacement, the primary objective of Hen Harrier surveys should be to identify all Hen Harrier breeding and winter roosting sites in suitable habitat within a 2km radius of proposed works (i.e. any likely source stimulus in terms of disturbance or displacement - with the distance of 2km being the radius stipulated by SNH guidance). This approach was formulated in consultations with NPWS and is supported in SNH guidance.

8.1.8.8.1 Vantage Points Surveys 2016, 2017, 2018 and 2019

Breeding Season – 2016 & 2017; 2019

The methodology selected was that published by SNH in respect of breeding raptor surveys (more specifically Hardey et al., 2013), which describes the survey techniques to establish breeding territory /nest site location and occupancy by Hen Harrier. This method corresponds to that utilized to date in National Surveys for the species in the republic (e.g. Ruddock et al., 2012, 2015) and also research into the species (Irwin et al., 2015 and Wilson et al., 2015). As no pathways exist for collision mortality from a proposed underground cable, then flight activity surveys purely to establish levels of flight activity and inform collision risk modelling as per a typical wind energy development were not scoped in.

For breeding season surveys to establish nesting attempts, 12 No. historical vantage points were ground-truthed (for visibility) and fixed. These vantage points were used during the 2016 (March to June inclusive) and 2017 (March to August inclusive) breeding seasons. Additional effort in the months of July and August was added to surveys in 2017 as some nesting attempts occurred later than the previous year. The 12 No. vantage points used, focused on suitable nesting habitat and historical nest locations in the UWF Grid Connection area. These surveys were carried out for the previous (2018) UWF Grid Connection application. Breeding Season Surveys for the subject application (2019 UWF Grid Connection), which were carried out in April 2019 and July 2019, utilised 10. No. Vantage Points (VPs) to determine the occupancy status of the nesting territories within 2km of the current 110kV UGC route and the current status of the cumulative study area around Upperchurch Windfarm and UWF Related Works areas. The grid references for 10. No. 2019 Vantage Point locations (in ITM co-ordinates) are listed in Table 4 in Appendix 8.4: Hen Harrier Fieldwork and Survey Results.

Winter Roosts – 2016/17 and 2017/18

For winter roost surveys 7 No. of the 12 No. 2016/2017 vantage points were employed during the Sept 2016 to Feb 2017 and Sept 2017 to Feb 2018 periods. Winter surveys were stratified to coincide with dawn and dusk periods, as per Best Practice guidance (SNH, 2014 and guidance for the Irish Winter Hen Harrier Roost Survey (IWHHRS) from O'Donoghue, 2010), to establish the locations of communal roosts. Grid references of vantage points utilised as provided in Table 3 in Appendix 8.4: Hen Harrier Fieldwork and Survey Results.

By virtue of the prior appraisal of Upperchurch Windfarm, breeding occupancy and presence of winter roosts has already been established for those areas of habitat within and proximal to the Upperchurch Windfarm, which includes the UWF Related Works, and elements of the UWF Other Activities.

Detailed Survey Results

The details of timing, duration and weather conditions for vantage point surveys undertaken from 2016 to 2019 are listed in Tables 7 to 12 in Appendix 8.4: Hen Harrier Fieldwork and Survey Results.

Detailed results of the Hen Harrier Survey are presented in Tables 16 to 27 in Appendix 8.4: Hen Harrier Fieldwork and Survey Results.

8.1.8.8.2 Hen Harrier Habitat Suitability Mapping May 2019

Habitats were initially identified using shapefiles provided from existing habitat information arising the Hen Harrier SPA Mapping Project undertaken by NPWS (Moran & Wilson-Parr, 2015). However, these only relate to habitats within the SPA, so **an additional mapping exercise was undertaken to extend the coverage to include non-SPA habitat within 2km of each nest**. Habitats were initially identified from aerial photos. Where the identification of habitats from aerial photos could not be confirmed, a ground-truthing exercise was undertaken in May 2019, to check the habitats actually present. As well as identifying unknown habitats, the ground-truthing exercise also sampled a variety of the identified habitats to ensure the habitats identification process was accurate and robust.

All habitat parcels, including both polygon's for fields (or areas-based habitats) and lines for linear habitats (such as hedgerows and treelines) were digitised, allowing accurate measurement of area or length.

The identified habitats were classed as suitable or unsuitable for both nesting and foraging. Habitats identified as suitable for nesting by Hen Harriers were wet grassland, peatland habitats (including heath), scrub, dense bracken and both pre- and post-thicket forestry (as per Ruddock *et al*., 2016). Habitats considered unsuitable for nesting included agricultural grasslands (including improved grasslands and rough grazing), clearfell, hedgerows and treelines (Ruddock *et al*., 2016).

Detailed Survey Results

For habitat suitability classifications see Tables 13 of Appendix 8.4: Hen Harrier Fieldwork and Survey Results and for extent of suitable/unsuitable habitat see Tables 14 of Appendix 8.4: Hen Harrier Fieldwork and Survey Results.

8.1.8.9 Fieldwork Methodology – General Birds

8.1.8.9.1 Breeding Bird Surveys

The whole length (c.30km) of the 110kV UGC route was surveyed in 40 transects in April 2019. Survey work was carried out over seven days in April 2019 (12, 17, 18, 20, 25, 27 and 28). The methodology followed the standardised line transect methodology for surveying birds (BWI, 2012). All birds were recorded onto standardised recording sheets in four distance categories from the proposed UGC route (0-25m; 25-100n; 100+m and in flight). A standardised bird transect survey was also undertaken at the Mountphilips Substation site in the breeding seasons of 2016 and 2017 and non-breading seasons of 2016/ 2017 and 2017/2018. The 2019 transects included Mountphilips Substation site.

Transect data were recorded using standard Countryside Bird Survey (CBS) methodology (Birdwatch Ireland, 2012). The conservation status of each species recorded during the field surveys was assessed using the Birds of Conservation Concern in Ireland (BoCCI) list (Colhoun & Cummins, 2013) in addition to relevant national or international legal designations.

Available data on breeding birds within the EIS documentation for the Upperchurch Windfarm was reviewed within the context of overlap with the locations of UWF Related Works, UWF Replacement Forestry and UWF Other Activities. Due to the continuity and overlap of habitat types present throughout the respective elements, a sufficient representative sample of breeding birds is considered to have been achieved through both the results of the current study and previously conducted studies.

Detailed Survey Results

For General Birds Survey Results see Table 4 to 8 (Mountphilips Transect); Table 1 (110kV UGC route); Table 12 (Bird Sensitivity Ratings) in Appendix 8.7: General Birds Fieldwork and Survey Results.

8.1.8.9.2 Kingfisher Surveys

With regard to Kingfisher, the suitability of watercourses 300m upstream and downstream of watercourse crossing locations was appraised in January and May 2019 (in tandem with Otter surveys). These surveyed watercourses include the Newport River (W7), Clare River (W26) and Bilboa River (W53) and 23 other watercourses (W5, W7, W8, W9, W18, W21, W22, W23, W26, W28, W29, W30, W33, W35, W39, W41, W42, W46, W47, W48, W49, W50, W51 and W52). These rivers were selected due to their possible potential to support suitable Kingfisher foraging and nesting habitats, and the potential for greater prey item availability. Watercourse crossings along the UWF Grid Connection route are generally unsuitable for nesting Kingfisher, which requires sandy or earth banks alongside the watercourse to establish their tunnel/burrow nests.

In addition, Kingfisher surveys extending to 500m upstream and downstream of W7 Newport River crossing point, following the Best Practice methodology presented in National Roads Authority (2008), was undertaken on 26 June 2019 (in tandem with the Otter surveys). Suitable watercourses were evaluated for any evidence of nest holes within 300m of the crossing locations. In each case banks were inspected for evidence of Kingfisher, and general suitability of banks in proximity to crossing locations for nesting Kingfisher. Target notes were made on suitable nesting banks, and any observed nest holes.

Detailed Survey Results

For Kingfisher Survey Results see Table 2 in Appendix 8.7: General Birds Fieldwork and Survey Results.

8.1.8.9.3 Barn Owls

In February 2019, buildings were noted for potential suitability for Breeding Barn Owls. In July 2019, buildings identified as having high suitability for Barn Owls were surveyed. This involved checking for signs of building occupation (such as pellets, feathers, etc.). All Barn Owl surveys were carried out in accordance with *Barn Owl Surveying Standards for National Road Projects,* (TII, 2017).

Detailed Survey Results

For Barn Owl Survey Results see Table 3 in Appendix 8.7: General Birds Fieldwork and Survey Results.

8.1.8.10 Fieldwork Methodology - Habitats

8.1.8.10.1 Habitat Surveys

All habitat surveys undertaken followed best practice guidance (Smith et al., 2011) and utilised the habitat classification presented in Fossitt (2000). All habitats within a 50-m buffer of work locations were surveyed and classified to level 3. All surveys were carried out in good weather.

Habitat surveys of the UWF Grid Connection were undertaken in January 2019 and May 2019. Whilst January is outside of the optimal survey season for flora, this survey was adequate for the biodiversity sensitivities occurring within the study area and also allowed for the identification of habitat classification to the appropriate resolution. Nomenclature for vascular plants follows Parnell and Curtis (2012).

Detailed Survey Results

For Habitats (non-linear and linear respectively) surveyed within 50m of the UWF Grid Connection works locations. Section 8.3.2 for UWF Grid Connection and Section 8.3.3 for the Whole UWF Project Appendix 8.3: Terrestrial Habitats Survey Results & Impact Calculations.

8.1.8.11 Fieldwork Methodology – Aquatic Ecology/Fisheries

8.1.8.11.1 Classification of the Ecological Value of Watercourses

A watercourse characteristics survey of crossing locations along the UWF Grid Connection route (by INIS Ecologists and by the authors of the Water chapter (Hydro Environmental Services) was carried out visually on the 17th, 22nd, 23rd and 28th of January 2019 and May 2019, during which the following physical parameters and habitat quality indicators were recorded at each watercourse crossing point - Grid coordinates; Watercourse feature i.e. drain, stream or river; Crossing type e.g. existing culvert, new crossing; Channel width and depth (m); Substrate type - listing substrate fractions in order of dominance i.e. large rocks, cobble, gravel, sand, mud, etc; Target notes on fisheries habitat and character including: features such as extent of riffle and glide/bank stability; salmonid suitability i.e. spawning / juvenile rearing habitat; and lamprey suitability. Surveys of watercourse crossing locations on haulage routes associated with the UWF Grid Connection were carried out in June, 2017.

Following the above broad characterisations, and using Best Practice, INIS evaluated each watercourse crossing for UWF Grid Connection for fisheries and assigned a fisheries importance rating of Optimal, Sub-Optimal or Poor. These instances of marginal fisheries value (typically between Sub-Optimal and Poor) were classified as Sub-Optimal. Best Practice literature utilised was as follows: Barbour et al. (1991); Kelly & King (2001); Kennedy *et al.* (1986); Greenberg *et al*. (1998); Hatfield *et al.* (2000) and O'Grady *et al.* (1993). The full titles of these Guidelines are listed in the Reference list at the end of this Chapter 8.

Detailed Survey Results

For number and classification of watercourse crossings see, Section 8.2.2 in Appendix 8.2: Aquatic Habitats & Species Fieldwork & Survey Results.

8.1.8.12 Fieldwork Methodology - Bat Species

Survey aims

The aims of the bat surveys were to:

- Assess the bat roost suitability of bridges, buildings and mature trees that could be directly affected
- Identify potential indirect effects on bats, e.g. from disruption of commuting routes, or lighting

Survey of potential bat roosts in January 2019

A preliminary ecological appraisal was carried out for all buildings within 150m of the development works using the approach outlined in Section 4.3 of Bat Conservation Trusts Guidelines (Collins, 2016). All buildings were assigned a suitability category of negligible, low, moderate or high suitability, based on the age and condition of structural features used by roosting bats (e.g. roof tiles, attic spaces, soffit / fascia boards, walls).

Ground-level roost assessments were carried out for all trees with moderate or low bat suitability within 50m of the development works, using binoculars (Steiner SkyHawk 3.0 10x42). The aim of the ground-level inspection was to identify any potential roost features (cavities or crevices on trunks or limbs) and evidence of bats (e.g. droppings, fur-oil stains at access points). Coniferous trees within plantations were not inspected, because they are rarely large enough to have any features suitable for bats, and because it is standard forestry practice to remove any trees that have obvious signs of damage and disease; as a result, trees within plantations typically have negligible suitability for bats.

As the 110kV UGC will be installed over/under c. 65 watercourse crossing structures (i.e. bridges and culverts), all structures along the route were inspected. Presence / absence bat surveys and/or roost characterisation surveys were carried out at 11 watercourse crossing structures (deemed suitable) along the 110kV UGC route. Some watercourse crossing structures could be surveyed using a high-powered torch and/or an endoscope, allowing detailed inspections of all crevices. In other cases, presence / absence surveys and roost characterisation surveys were carried out at dusk and dawn using an Anabat Walkabout detector (Titley Scientific); this is a high-specification modern bat detector that is fit for purpose.

These surveys were conducted on the 17th, 22nd and 23rd January 2019 and in May 2019.

Mountphilips Substation and Upperchurch Windfarm Substation Bat Activity surveys

Bat Activity Surveys at Mountphilips Substation Site and Upperchurch Substation Site were undertaken using automated Anabat Express bat detectors (Titley Scientific). External microphones were mounted on canes at a height of approximately 1.5m in order to obtain 'clean' recordings that were not affected by surrounding vegetation. One detector was placed in each location for two nights in the mid-summer period (June – August 2016) and two nights in the autumn season (September / October 2016). Night length ranged from 7.15 hours in late June to 12.45 hours in early October, giving a total survey effort of approx. 35-40 hours at each sampling point. We consider that this survey effort was sufficient to provide a good representation of bat activity during their most active periods, and that it was proportionate to the potential effects as discussed in Section 2.2.5 of Collins (2016). Surveys were carried out during suitable weather conditions, i.e. minimum temperatures above 10°C, average winds of less than 4m/s and little or no rainfall. There was wet weather or high winds on some of the survey nights in September, so the survey was extended until two nights of suitable conditions were obtained. Results of this survey are still considered viable for the revised appraisal given little or no change to baseline habitat structure has occurred in the interim.

Calculation and comparison of bat activity indices

In order to standardise bat activity between the mid-summer and autumn survey periods, results are displayed as a 'Bat Activity Index', which is the total number of bat passes divided by the number of hours

per night (Hundt, 2012). This was calculated from sunset to sunrise, using publicly-available data from www.timeanddate.com.

At present there is not a standard system to categorise bat activity as low, moderate or high, because the results vary depending on the species involved and the location of the site. For the purposes of this report we use a bespoke system to discuss and compare levels of bat activity at the site, as outlined in the below Table. This approach uses standardised terms (e.g. occasional, frequent) to categorise bat activity indices within certain ranges; the average time interval between passes is also provided to give a more-intuitive interpretation of the terms.

Characterisation of Bat Activity Indices

Bat Activity Index	Average interval between calls	Terms of characterisation
<2	> 30 minutes	Negligible
2 - 12	5 – 30 minutes	Occasional
12 – 60	1 – 5 minutes	Frequent
>60	< 1 minute	Near-constant

Species identification and interpretation of data

Sonograms from Anabat Express detectors were obtained in the 'zero-crossing' format and viewed using AnalookW software (Corben 2014). Species were identified with reference to *British Bat Calls: A Guide to Species Identification (Russ 2012)* based primarily on frequency and call shape, but also with reference to call slope for Myotis spp. Social calls were classified as unidentified bats unless they closely matched the examples provided in Russ (2012).

It is acknowledged that Myotis spp. can have very similar calls, and that the classification of sonograms can be imprecise, so all Myotis records in this document should be considered as conferre records, i.e. Myotis cf daubentonii. There can also be overlaps in call frequency between Pipistrellus spp. - calls with a CF component at 50 kHz may be either soprano pipistrelle or common pipistrelle, while calls at 40 kHz may be either common pipistrelle or Nathusius' pipistrelles – but in most cases, it is possible to determine the species based on call characteristics and/or other calls immediately before or after the recording. If a bat pass could not be confidently identified to species level it was recorded as an unidentified bat, or identified only to genus level (e.g. Myotis spp.).

Valuation of ecological features and assessment of impacts

Impacts were assessed using the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM 2018) and *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017). Reference was also made to Wray *et al.,* (2010) with regards to the evaluation of roosts and commuting routes / foraging areas.

Detailed Survey Results

For Bat Roost Survey Results and Bat Activity Survey Results see Section 8.8.3.1 in Appendix 8.8: Bat & Non-Volant Mammals Data

8.1.8.13 Fieldwork Methodology - Non-Volant Mammals

Surveys for all legally protected non-volant mammal species were undertaken within a 50m buffer of the UWF Grid Connection, with the exception of otter (listed separately below). The surveys to inform the first 2018 planning application (partially relied on herein) was undertaken on 8th – 11th March, 2016. Results of this survey are still considered viable for the revised appraisal given little or no change to baseline habitat structure has occurred in the interim. Additional surveys were undertaken on 29th August 2016, 29th September 2016, 5th/6th April 2017. Updated surveys of the current, proposed, route of the 110kV UGC were completed in 17th, 22nd, 23rd January and 30th May 2019.

Otters

Otter surveys followed the NRA *Guidelines for Treatment of Otters During Construction of National Road Schemes* (NRA, 2008), which state that, although there are no seasonal constraints for otter surveys, any dense vegetation (especially in summer) can reduce success in the identification of otter holts or couches. Hence the confirmatory surveys were scheduled for winter 2019 in order to optimize detection of otters and also in May 2019.

Guidance on the extent of the study area for otters was taken from the *British Highways Agency's Nature Conservation Advice in Relation to Otters HA8199* (Highways Agency, 1999) which dictates a linear search of 300m upstream and downstream of each watercourse crossing is undertaken.

Badgers

According to the NRA Guidelines for the Treatment of Badgers Prior to Construction of National Road Schemes (NRA, 2005), survey of setts within 50m of the proposed works location is required. Badger surveys are significantly constrained by vegetative cover and season, and are best conducted from November to April (NRA, 2005). In accordance with NRA guidance, all areas were systematically searched for setts and all hedgerows and boundaries were checked comprehensively by Inis ecologists. Badger territorial activity is high from mid-January to March and surveys at this time are most efficient in identification of badger paths, latrines and feeding signs. Surveys for evidence of the presence of badgers within 50m of the proposed works (were completed in January and May 2019. The revised footprint of the Mountphilips Substation site was also re-surveyed for signs of mammal evidence in July of 2019.

Other Mammals

The following field signs of all mammals were recorded during non-volant mammal surveys within the study area:

- Well-used pathways;
- Prints/tracks;
- Scat/spraints/droppings;
- Signs of feeding (foraged pine cones, badger snuffle holes)
- Places of shelter and features or areas likely to be of particular value as foraging resources (NRA 2004).

Photographs and detailed notes were also recorded for each feature and mapped using ArcGIS 10.4.

For Non-Volant Mammals Survey Results see Section 8.8.3.2 in Appendix 8.8: Bat & Non-Volant Mammals Data

8.1.9 Certainty and Sufficiency of Information Provided

The biodiversity baseline information was collated from site investigations and field surveys, along with publically available online resources including Biodiversity Data Centre (NBDC), National Parks & Wildlife Service (NPSWS), Environmental Protection Agency (EPA), and Inland Fisheries Ireland (IFI), which are regularly updated. In all cases the most recent publications available are relied on. All documentation used is referenced at the end of the chapter. A clear documentary trail is provided throughout this chapter, and chapter appendix, Appendix 8.1 - Appendix 8.9, to the competency of data and methods used and the rationale for selection of same. All field survey work was carried out by qualified and experienced ecologists. Baseline information was also supplemented by the baseline information for Upperchurch Windfarm (EIS & RFI 2013), UWF Related Works (EIAR 2018, Revised EIAR 2019) and UWF Replacement Forestry (EIAR 2018).

For the avoidance of doubt, with respect to Hen Harrier, although studies conducted in 2016 and 2017 were in relation to a different 110kV UGC route for the previous 2018 UWF Grid Connection application (PL92.301959) and therefore different study extent, consultation with local experts and NPWS was undertaken in 2019 for the current appraisal to determine whether or not additional nests were known from any areas outside the prior study extent. Results of this consultation was used to scope possible territories requiring survey in 2019 (within 2km of the now proposed route of the 110kV UGC) in line with Best Practice (Hardey et al., 2014) and for which the results are herein presented.

The evaluation of the baseline environment and potential for impacts has been informed by and carried out using best practice guidance, namely *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* (Chartered Institute of Ecology and Environmental Management, 2016 and 2018). The professional judgement of the ecologist has been used in the scoping of surveys, interpretation of data, and assessment of impacts; this approach is consistent with the CIEEM guidelines. Sensitivity and magnitude were evaluated using the NRA/Percival combined methodology outlined in Section 8.1.8. A clear documentary trail is provided throughout this chapter regarding the data and methods used in the evaluation. All documentation used is referenced at the end of this Biodiversity chapter.

In respect of Biodiversity no material limitations or difficulties were encountered, nevertheless some minor limitations are discussed below:

Restricted Access to Properties: It was not always possible to obtain permission to enter private property and/or to access the interior of buildings, such as for example two buildings initially evaluated as suitable for Barn Owl. One building which was unsafe to enter has been classified as used by Barn Owl on the basis of owner information on sightings, and the second building has retained its classification as highly suitable, following a precautionary approach, although the only access point was a broken chimney stack. No limitation therefore exists.

8.2 Sensitive Aspect No.1: European Sites

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

We note that findings of the effects of the UWF Grid Connection (either alone or in combination with other projects) on European Sites are fully considered and evaluated in the Appropriate Assessment Report for UWF Grid Connection (herein referred to as the NIS). This NIS is included in Volume E: Appropriate Assessment Reporting for UWF Grid Connection of the planning application for the UWF Grid Connection.

In line with EIA Directive Guidance, findings are summarised herein; however, and for the avoidance of doubt, we refer the NIS for detailed examination and analysis of likely significant effects in respect of European Sites.

8.2.1 BASELINE CHARACTERISTICS of European Sites

8.2.1.1 STUDY AREA for European Sites

The study area for European Sites in relation to the UWF Grid Connectoin is described in Table 8.12 and illustrated on Figure GC 8.2.1: UWF Grid Connection Cumulative Evaluation Study Area for European Sites and Figure GC 8.2.2 – GC 8.2.5: Location of UWF Grid Connection in relation to Lower River Shannon SAC, Lower River Suir SAC, Clare Glen SAC and Slievefelim to Silvermines Mountain SPA (Volume C3 EIAR Figures).

Table 8-12: UWF Grid Connection Study Area for European Sites

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

8.2.1.2 Baseline Context and Character of European Sites in the UWF Related Works Study Area

European sites such as candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs) designated within the Natura 2000 network are herein considered.

To avoid duplication of the detailed evaluation of European Sites covered in the Appropriate Assessment Report, only the key findings of the Appropropriate Assessment report are included herein.

8.2.1.2.1 Stage 1 Screening – Connected to or Necessary for the Management of a European Site?

UWF Grid Connection is not directly connected to or necessary for the management of any European Site

8.2.1.2.2 Stage 1 Screening Evaluation

A Screening for Appropriate Assessment was carried out which examined the potential effects of the UWF Grid Connection project, either alone or in combination with other projects or plans, upon a European site and considered whether it could be objectively concluded that these effects will not be significant.

A total of 23 European or Natura Sites were identified within the UWF Grid Connection Study Area. These European Sites comprise nineteen Special Areas of Conservation (SAC) and four Special Protection Area (SPA for birds). These European Sites and their respective distance to the UWF Grid Connection are outlined in Table 8.13, and identified on Figure GC 8.2.1 and Figure CE 8.2.1: Cumulative Evaluation Study Area for European Sites. The Screening evaluation is included in Volume E: Appropriate Assessment Reporting.

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Table 8-13: European Sites within 15km of the proposed UWF Grid Connection project

	European Site	Distance from UWF Grid Connection
1	Slievefelim to Silvermines Mountain SPA (004165)	0m
2	Lower River Shannon SAC (002165)	0 m
3	Lower River Suir SAC (002137)	4.3 km
4	Anglesey Road SAC (002125)	2.9 km
5	Bolingbrook Hill SAC (002124)	8.5 km
6	Keeper Hill SAC (001197)	4.3 km
7	Silvermine Mountain SAC (000939)	9.4 km
8	Silvermine Mountain West SAC (002258)	7.7 km
9	Philipston Marsh SAC (001847)	12.0 km
10	Kilduff, Devilsbit Mountain SAC (000934)	16.8 km
11	Clare Glen SAC (000930)	1.6 km
12	Glenstal Wood SAC (001432)	2.6 km
13	Slieve Bernagh Bog SAC (002312)	11.5 km
14	Lough Derg, North-East Shore SAC (002241)	26.3 km
15	Glenomra Wood SAC (001013)	11.3 km
16	Tory Hill SAC (000439)	26 km
17	Ratty River Cave SAC (002316)	24.5 km
18	Askeaton Fen Complex SAC (002279)	31 km
19	Barrigone SAC (000432)	44 km
20	Curraghchase Woods SAC (000174)	33.4 km
21	Lough Derg (Shannon) SPA (004058)	10.2 km
22	River Shannon and River Fergus Estuaries SPA (004077)	16.9 km
23	Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)	50.9 km

8.2.1.2.3 Results of the Screening Evaluation

The results are that **is there is no potential or no likelihood for UWF Grid Connection to cause any significant effects to the following 19 no. European Sites (16 SACs, 3 SPAs):**

- Anglesey Road SAC (002125),
- Bolingbrook Hill SAC (002124),
- Keeper Hill SAC (001197),
- Silvermine Mountain SAC (000939),
- Silvermine Mountain West SAC (002258),
- Philipston Marsh SAC (001847),
- Kilduff, Devilsbit Mountain SAC (000934),
- Glenstal Wood SAC (001432),
- Slieve Bernagh Bog SAC (002312),
- Lough Derg, North-East Shore SAC (002241),
- Glenomra Wood SAC (001013),
- Tory Hill SAC (000439),
- Ratty River Cave SAC (002316),
- Askeaton Fen Complex SAC (002279),

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- Barrigone SAC (000432),
- Curraghchase Woods SAC (000174),
- Lough Derg (Shannon) SPA (004058,
- River Shannon and River Fergus Estuaries SPA (004077), and
- Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161).

Therefore, these EU sites have been 'Screened Out' at Stage One of the Appropriate Assessment process.

The results of the screening were also that UWF Grid Connection has potential, via impact pathways, to cause significant effects to the following 4 European Sites (3 SACs, 1 SPA);

- **Lower River Shannon SAC**
- **Lower River Suir SAC, and**
- **Clare Glen SAC (000930),**
- **Slievefelim to Silvermines Mountain SPA**

These sites are described below.

8.2.1.2.4 Lower River Shannon SAC

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.

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head. The site 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. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

This site contains the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. This site supports more wintering wildfowl and waders than any other site in the country and supports a large number of migratory birds.

Qualifying Interests: The following Lower River Shannon SAC Qualifying Interest habitats and species were screened in for evaluation at Stage 2 of the process:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
- Alluvial Forests (91E0)* (priority habitat)
- Atlantic Salmon [1106]
- Sea Lamprey [1095]
- Brook Lamprey [1096]
- River Lamprey [1099]
- Otter [1355]

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, specifically within the Newport [Tipperary]_SC_010, Kileengarrif_SC_010, and Bilboa_SC_010 Sub-Catchments. See Figure GC 8.2.2: Location of UWF Grid Connection and other projects/activities in relation to Lower River Shannon SAC.

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 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 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.

8.2.1.2.5 Lower River Suir SAC

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.

Qualifying Interests: The following Lower River Suir SAC Qualifying Interest habitats and species were screened in for evaluation at Stage 2 of the process:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
- Alluvial Forests (91E0)* (priority habitat)
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
- Yew Woodlands* Taxus baccata woods of the British Isles [91J0] (priority habitat)
- Old sessile oak woods with Ilex and Blechnum in the British Isles
- Freshwater Pearl Mussel [1029]
- White-clawed Crayfish [1092]
- Sea Lamprey [1095]
- Brook Lamprey [1096]
- River Lamprey [1099]
- Atlantic Salmon [1106]
- Otter [1355]

[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.

Overlap with the SAC Boundary: No part of the UWF Grid Connection overlaps the boundary of the Lower River Suir SAC. The UWF Grid Connection construction works are located c.12km upstream of the River Suir SAC, where 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. See Figure GC 8.2.3: Location of UWF Grid Connection and other projects/activities in relation to Lower River Suir SAC.

8.2.1.2.6 Clare Glen SAC

This SAC lies on the Limerick - Tipperary border, in the western foothills of the Slievefelim Mountains, about 10 km north-west of Cappamore. The glen was formed by the action of the Clare River cutting into the Old Red Sandstone. The site comprises the wooded river valley. The woodland, although planted with many exotic trees, is mature and conforms to a type listed on Annex II of the E.U. Habitats Directive. The presence of a number of rare and scarce species including bryophytes and fungi adds further to its importance.

Qualifying Interests: The following Clare Glen SAC Qualifying Interest habitats and species were screened in for evaluation at Stage 2 of the process:

- Old Oak Woodlands [91A0]
- Killarney Fern (Trichomanes speciosum) [1421]

Overlap with the SAC Boundary: No part of the UWF Grid Connection overlaps the boundary of the Clare Glen SAC. Clare Glen SAC comprises 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. See Figure GC 8.2.4: Location of UWF Grid Connection and other projects/activities in relation to to Clare Glen SAC.

8.2.1.2.7 Slievefelim to Silvermines Mountain SPA

This SPA is an upland site located in Counties Tipperary and Limerick. It includes the peaks Keeper Hill, Slieve Felim, Knockstanna, Knockappul, Mother Mountain, Knockteige, Cooneen Hill and Silvermine Mountain. The site is underlain mainly by sandstones of Silurian age. Several important rivers rise within the site, including the Mulkear, Bilboa and Clare. The Slievefelim to Silvermines SPA is of ornithological importance because it provides nesting and foraging habitat for breeding Hen Harrier.

The Slievefelim to Silvermines Mountain SPA as a whole covers 20,917ha[5], has held between seven (2010) and ten (2015) pairs of nesting Hen Harrier (Ruddock *et al*., 2016), and is considered one of the strongholds for Hen Harrier in the country. The SPA has a high proportion (70%) of suitable habitat, totalling 14,552ha (extrapolated from data in Moran & Wilson-Parr, 2015). Within the SPA, nesting Hen Harriers have shown a preference to nest in the early stages of new and second-rotation conifer plantations, though some pairs may still nest in tall heather of unplanted bogs and heath[6]. Hen Harrier surveys, carried out between 2016 and 2019 for the UWF Grid Connection, found that Hen Harriers within the UWF Grid Connection Study Area all nested within this SPA – no nests were recorded outside of the SPA boundary.

Special Conservation Interest: The following Special Conservation Interest species was screened in for evaluation at Stage 2 of the process: Hen Harrier [A082]

Overlap with the SPA Boundary: The Mountphilips Substation is not located within the SPA; however, the 110kV UGC, which is 30.5km in length, passes through the boundary of the SPA for 8km in total. Where the 110kV UGC is routed outside of the Mountphilips Substation site (including through the SPA area), the 110kV

[5] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004165.pdf
[6] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004165.pdf

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UGC is entirely located within paved roads. The public road in question, through the boundary of the SPA, is the aforementioned Regional Road R503 which links Thurles to Limerick city.

See Figure GC 8.2.5: Location of UWF Grid Connection in relation to Slievefelim to Silvermines Mountain SPA.

8.2.1.3 Importance of European Sites

The EU Habitats Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora formed a basis for the designation of Special Areas of Conservation (SACs). Similarly, Special Protection Areas are legislated for under the Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds). Collectively SACs and SPAs are referred to as Natura 2000 sites, or 'European' sites. For the purposes of this report, they are considered to be of **International Importance**.

8.2.1.4 Sensitivity of European Sites

SAC designated sites are sensitive to hydrological changes to groundwater and surface water quality which may affect water dependant ecosystems, and habitat disturbance or loss. Within individual Designated Sites (both SAC's and SPA's), specific species may be sensitive to disturbance, displacement, habitat loss or a reduction in prey item species or accidental mortality, which could reduce their favourable conservation status. Designated sites are also sensitive to encroachment by invasive species.

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

8.2.1.5.1 Special Protection Areas (SPAs)

Trends in respect of taxa designated under the EU Birds Directive (SPA's) are reported to the EU under Article 12[7] of said directive. The most recently available trend information covers the period 2008-2012. Longer term trends in regard to wintering and breeding taxa across the SPA network are largely unknown[8].

The 2014 Report covers 196 bird species, including species which live in Ireland all year round and others which migrate here for summer or winter. It provides a picture of both short-term and long-term trends for some species, and similarly a view of the breeding range trends in some species. However, there is an absence of long-term data for some species. The report was required to provide information on trends rather than a conclusive assessment of status, as is the case in the Article 17 report. In summary, 58% of species populations were stable or increasing in the short term, while 27% were decreasing. However, looking at long term data (where available) 36% were stable or increasing, while 28% were decreasing[9].

8.2.1.5.2 Special Areas of Conservation (SACs)

Reporting on trends with regard to protected habitats and species under the EU Habitats Directive is provided to the EU under Article 17 of said directive. The most recently available trend information in respect of individual habitats and species was published in 2019[10].

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

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

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

[10] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

Habitats

Under Article 11 of the Directive, each member state is obliged to undertake surveillance of the conservation status of the natural habitats and species in the Annexes and under Article 17, to report to the European Commission every six years on their status and on the implementation of the measures taken under the Directive. In April 2019, Ireland submitted the third assessment of conservation status for 59 habitats.

The Overall Status of habitats as depicted in the report is that 85% of habitats are in Unfavourable (i.e.Inadequate or Bad) status, with 46% of habitats demonstrating ongoing declining trends.

Many of the changes from previous assessments are due to improved knowledge e.g. marine habitats, changes of interpretation of the ecology of the habitat e.g. Rynchosporion depressions, or changes in the thresholds for Structure and Functions e.g. Juniper scrub. Therefore, the actual status (i.e. Favourable, UnfavourableInadequate or Unfavourable-Bad) of habitats has remained largely unchanged over time but with ngoing declining trends impacting almost half of all habitats. Although some habitats had insufficient Range and Area when the Directive came into force (e.g. active raised bog, hay meadows and many woodland habitats), it is the Structure and Functions of the habitats that is driving the Overall Status results in many cases, with inadequate conservation measures in place to improve the Future Prospects. Declining trends are particularly notable in marine, peatland, grassland and woodland habitats.

Pressures and threats are recorded in 54 of the 59 habitats assessed. The most frequent pressures recorded in habitats relate to the agriculture category. Over 70% of habitats are impacted by pressures relating to agricultural practices, and the pressure is ranked as High importance in more than 50% of habitats.

The next most frequent category of pressure to be recorded in habitats is “I Alien and problematic species” (listed as a pressure in 42% of habitats), closely followed by “F Development, construction and use of residential, commercial, industrial and recreational infrastructure and areas”, a pressure in 41% of habitats. However, alien and problematic species are high-importance pressures at just 12% of habitats, while infrastructure is recorded as a high-importance pressure in 22% of habitats.

Conservation measures are reported as being undertaken in 36 habitats. For 27 of these habitats, the main purpose of the conservation measures is to maintain the Range, Area or Structure and Functions of the habitat. For five habitats the main purpose of the measures is to restore the habitat, while for the remaining four the purpose of the measures is to increase the habitat area.

Species

Of the 68 Habitats Directive-listed species in Ireland, eight species have been described as vagrants. These include six cetacean species, Allis shad (Alosa alosa) and Brandt’s bat (Myotis brandtii). The latter two species have been assigned to this category since 2007 as there is no evidence of breeding populations of these species. The Nore pearl mussel (Margaritifera durrovensis) is no longer considered a separate species from the freshwater pearl mussel.

The Overall Status of the remaining 60 species (including three species groups) is that 57% of species are in Favourable status and 30% are in Unfavourable status (i.e. Inadequate or Bad), with 72% demonstrating stable or improving trends while 15% demonstrate ongoing declining trends.

Many species remain in Favourable status. Population increases and Range expansion have been observed for several bat species, marsh fritillary (Euphydryas aurinia), otter (Lutra lutra) and pine marten (Martes martes). Ongoing declines are reported for all whorl snails, freshwater pearl mussel, lesser horseshoe bat (Rhinolophus hipposideros) and maërl species. Knowledge has improved for many cetacean species and all data point to Favourable status for all species. A re-assessment of data for river lamprey (Lampetra fluviatilis) and leatherback turtle (Dermochelys coriacea) has resulted in an Unknown assessment for these species due to difficulties associated with identifying river lamprey juveniles and the paucity of records across a vast

marine area for the leatherback turtle.

Pressures are identified as impacting on 46 of the 57 taxa assessed. Threats are identified for 48 taxa.

Impacts from agricultural activities, and to a lesser extent forestry, are reported as having a negative effect on a wide range of species, including fish, molluscs, terrestrial mammals and vascular plants. This is because of the wide sphere of influence of some of these activities which, though implemented at relatively local levels, may influence a much wider area, particularly if they affect groundwater supplies or nearby watercourses. Examples include drainage, fertiliser application and clear-felling. The issue of alien species is a cross-cutting one, as it is for habitats, but it is recorded as a pressure for species much less frequently; however, the impact is predicted to increase over the next 12 years. In general, lower numbers of pressures and threats are reported for bat species than the other species groups, with no significant impacts noted for six of the nine bat species assessed.

Conclusion:

The conclusion is that most Irish habitats listed on the Habitats Directive are in Unfavourable status and almost half are demonstrating ongoing declines. The majority of species listed on the Habitats Directive are, however, in Favourable status in Ireland, and stable, although a small number are considered to be in Bad status and continue to require concerted efforts to protect and restore them.

8.2.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to designated sites, as identified above, will be the receiving environment at the time of construction – i.e. 2020/2021. due to the short separation period. Further trends in species and habitats as identified in reporting to Europe are likely overlap the operational phase, dependant on the occurrence of causal mechanisms such as identified pressures.

8.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.2.2.1 Cumulative Evaluation Study Areas

8.2.2.1.1 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. The study areas are illustrated on Figure CE 8.2.2 – CE 8.2.5: Location of UWF Grid Connection and other projects/activities in relation to Lower River Shannon SAC, Lower River Suir SAC, Clare Glen SAC and Slievefelim to Silvermines Mountain SPA (Volume C3 EIAR Figures).

UWF Grid Connection Cumulative Evaluation Study Area for European Sites	**Justification for the Study Area Extents**
Lower River Shannon SAC: 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	As per Chapter 11 Water - 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. The zone of cumulaitve impacts for SAC relates to the regional subcatchments, as any effects at a wider catchment level will be negligible due to dilution and dispersion.
Lower River Suir SAC: Suir_SC_030 sub-catchment within the Regional River Suir Hydrometric are HA16	As per Chapter 11 Water- defined by regional topography and drainage towards the SAC. The zone of cumulaitve impacts for SAC relates to the regional subcatchment, as any effects at a wider catchment level will be negligible due to dilution and dispersion.
Clare Glen SAC - Annagh (Tipperary)_030, Annagh(Tipperary)_020 and Annagh (Tipperary)_010 local surface water bodies	These local surface water bodies are all located upstream and hydrologically connected to the SAC, in the Killeengarriff_SC_010 subcatchment.
Slieve Felim to Silvermines Mountains SPA: SPA plus 2km around the boundary	Cumulative impacts should be assessed at the relevant biogeographical scale, so that the assessment of the impact of the development can be made alone and in combination with other developments- SNH 2018[11] Little information is available on the effects of grid infrastructure construction activities on breeding Hen Harriers, although effects from large scale development such as wind farms at distances of up to 1km from nests has been reported (Ruddock & Whitfield, 2007, Wilson *et al.* ,2015). An area of twice this has been conservatively selected in line with Best Practice, (SNH, 2017). This area is considered conservative in the context of the proposed UWF Grid Connection, which may not have the same magnitude of source impacts during construction and/or operation as other larger developments cited in the references above.

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

8.2.2.1.2 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 8.3.2.2.1 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 8-14 and illustrated on Figure CE 8.2.1: UWF Grid Connection Cumulative Evaluation Study Area for European Sites (Volume C3 EIAR Figures).

Table 8-14: Whole Project Cumulative Evaluation Study Area for European Sites

Cumulative Project	**Cumulative Study Area Boundary**	**Justification for Study Area Extent**
Element 1 : UWF Grid Connection Element 2: UWF Related Works Element 3: UWF Replacement Forestry Element 4: Upperchurch Windfarm (UWF) Element 5: UWF Other Activities	Lower River Shannon SAC: 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 Lower River Suir SAC: Suir_SC_030 sub-catchment within the Regional River Suir Hydrometric are HA16 Clare Glen SAC Annagh (Tipperary)_030, Annagh (Tipperary)_020 and Annagh(Tipperary)_010 local surface water bodies Slieve Felim to Silvermines Mountains SPA: SPA plus 2km around the boundary	Same study area as UWF Grid Connection Cumulative Evaluation Study Area - Professional Judgement

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

The evaluation of cumulative impacts to European Sites also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to European Sites with either the UWF 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 Cumulative Evaluations (Section A2.1.4.4).

The results of this scoping exercise are that: Milestone Windfarm, Rearcross Quarry, Newport Town Park proposed Curraghduff Quarry, Castlewaller Windfarm, potential Bunkimalta Windfarm and the Activities of Forestry, Agriculture, Turf-Cutting in the surrounding area have been scoped in for evaluation of cumulative effects to European Sites on the basis of potential interactions with the aquatic environment.

8.2.2.2.1 Potential for Impacts to European Sites

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect European Sites. The results of this evaluation are included in Table 8-15.

The location of the Other Elements in relation to European Sites is illustrated on Figures CE 8.2.

Table 8-15: 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/Excluded for the evaluation of cumulative effects in relation to: • Included: Lower River Shannon SAC • Included: Lower River Suir SAC • Excluded: Clare Glen SAC, not hydrologically connected • Included: Slievefelim to Silvermines Mountain SPA
Element 3: UWF Replacement Forestry	Included/Excluded for the evaluation of cumulative effects in relation to: • Included: Lower River Shannon SAC • Included: Lower River Suir SAC • Excluded: Clare Glen SAC, not hydrologically connected • Included: Slievefelim to Silvermines Mountain SPA
Element 4: Upperchurch Windfarm (UWF)	Included/Excluded for the evaluation of cumulative effects in relation to: • Included: Lower River Shannon SAC • Included: Lower River Suir SAC • Excluded: Clare Glen SAC, not hydrologically connected • Included: Slievefelim to Silvermines Mountain SPA
Element 5: UWF Other Activities	Included/Excluded for the evaluation of cumulative effects in relation to: • Included: Lower River Shannon SAC • Included: Lower River Suir SAC • Included: Clare Glen SAC • Included: Slievefelim to Silvermines Mountain SPA
Other Projects or Activities	
Rearcross Quarry (existing) Castlewaller Windfarm (consented windfarm & potential grid connection)	Included/Excluded for the evaluation of cumulative effects in relation to: • Included: Lower River Shannon SAC • Excluded: Lower River Suir SAC, not hydrologically connected • Included: Clare Glen SAC • Included: Slievefelim to Silvermines Mountain SPA

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Bunkimalta Windfarm (potential windfarm & consented grid connection)	
Newport Town Park (consented)	Included/Excluded for the evaluation of cumulative effects in relation to: • Included: Lower River Shannon SAC • Excluded: Lower River Suir SAC, not hydrologically connected • Included: Clare Glen SAC • Excluded: Slievefelim to Silvermines Mountain SPA, small scale development in Newport town
Milestone Windfarm (existing) Proposed Quarry at Curraghduff	Included/Excluded for the evaluation of cumulative effects in relation to: • Excluded: Lower River Shannon SAC, already constructed windfarm, absence of hydrological pathways • Included: Lower River Suir SAC • Excluded: Clare Glen SAC, not hydrologically connected • Included: Slievefelim to Silvermines Mountain SPA
Forestry Agriculture Turf-Cutting (in the surrounding area)	Included/Excluded for the evaluation of cumulative effects in relation to: • Included: Lower River Shannon SAC • Included: Lower River Suir SAC • Included:Clare Glen SAC • Included: Slievefelim to Silvermines Mountain SPA

8.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

The location of the Other Elements and Other Projects and Activiites in relation to the Lower River Shannon SAC, Lower River Suir SAC, Clare Glen SAC and the Slieve Felim to Silvermines Mountain SPA is provided below, and illustrated on Figure CE: 8.2.

8.2.2.3.1 Element 2: UWF Related Works

The UWF Related Works are mainly located in the Clodiagh (Tipperary[12]) River sub-catchment of the River Suir which drains downstream to the Lower River Suir cSAC, to the south of Holycross village (no works occur within the SAC). Some of the footprint of the UWF Related Works also drains downstream to the Lower River Shannon cSAC. The UWF Related Works location HW7 is located within the Slieve Felim to Silvermines Mountains SPA- however no works are required at this location

8.2.2.3.2 Element 3: UWF Replacement Forestry

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

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8.2.2.3.3 Element 4: Upperchurch Windfarm

The already consented Upperchurch Windfarm is located mainly in the Clodiagh (Tipperary) River sub-catchment which drains downstream to the Lower River Suir cSAC. Some of the footprint of the Upperchurch Windfarm drains downstream to the Lower River Shannon cSAC.
The Upperchurch Windfarm is located in its entirety outside the Slieve Felim to Silvermine Mountains SPA.

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

Consideration of the Passage of Time: A comparison of EPA monitoring data for 2012 and 2017 demonstrates that water quality in the catchments into which the windfarm site drains, has remained stable. Hen harrier habitat has remained sub-optimal and surveys during 2015 to 2017 recorded low usage of the windfarm site by hen harriers. In relation to the SPA, surveys conducted at the Upperchurch Windfarm site, and in the area of the windfarm site for UWF Related works and UWF Grid Connection demonstrate that hen harrier usage of the site continues to be very low, and limited to foraging with no nests within 2km. Therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this EIAR for UWF Grid Conneciton.

8.2.2.3.4 Element 5: UWF Other Activities

The UWF Other Activities are partially located in the Clodiagh (Tipperary) River sub-catchment which drains downstream to the Lower River Suir cSAC, where Haul Route Activities HA21-23 and Upperchurch Hen Harrier Scheme exist in proximity to the Upperchurch Windfarm.

Further Haul Route Activity locations such as tree trimming, overlaying of matting on verges and temporary street furniture removal extend northwards and then west before termination at Foynes. This brings a number of HA locations into closer proximity the Lower River Shannon SAC. Overhead Line Activities will also occur within the River Shannon catchment. Monitoring Activities will occur upstream of the Clare Glen SAC and within the Slievefelim to Silvermines Mountain SPA. No *works* however are proposed in respect of these activities in proximity to European Sites.

8.2.2.3.5 Other Projects or Activities

Existing Milestone Windfarm: Milestone Windfarm is an existing 4-turbine windfarm located on lands adjacent to the consented Upperchurch Windfarm. This windfarm is located entirely outside of the Slieve Felim to Silvermines Mountain SPA, upstream of the Lower River Suir SAC.

Curraghduff Quarry: A proposed quarry exists at Curraghduff, circa. 3.7km to the southeast of the 110kV UGC at the Consented UWF Substation. This quarry is located entirely outside of the Slieve Felim to Silvermines Mountain SPA, upstream of the Lower River Suir SAC.

Potential Bunkimalta Windfarm (and consented grid connection): a potential windfarm located within the Slievefelim to Silvermines SPA, c.5km to the north of the UWF Grid Connection. The windfarm will also be located upstream of the Lower River Shannon SAC and Clare Glen SAC.

Consented Castlewaller Windfarm (and potential grid connection): a consented windfarm located within the Slievefelim to Silvermines SPA, immediately adjacent to the UWF Grid Connection. It is located upstream of the Lower River Shannon SAC. None of the windfarm is located upstream of Clare Glen SAC, however part of the potential grid connection route and addition site access is located upstream of this SAC.

Consented Newport Town Park: a consented park adjacent to the Newport River and therefore adjacent to the Lower River Shannon SAC.

Existing Rear Cross Quarry: an existing quarry located in Shanballyedmond, near Rear Cross village, to the south of the UWF Grid Connection. Located within the Slievefelim to Silvermines Mountain SPA and upstream of Lower River Shannon SAC/Clare Glen SAC.

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

European Sites

Sensitive Aspect

8.2.3 PROJECT DESIGN MEASURES for European Sites

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

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

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

The Project Design Measures outlined in Table 8-16 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **European Sites**.

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, Invasives Species Managemnet Plan, Environmental Emergency Procedures and Best Practice Measures (See Volume D appended to this EIA Report)

Table 8-16: UWF Grid Connection Project Design Measures relevant to European Sites

PD ID	**Project Design Environmental Protection Measure (PD) (Mitigation Measures)**
Project Design Measures – Slievefelim to Silvermines Mountain SPA	
PD01	UWF Grid Connection construction works during the Hen Harrier breeding season (March to August inclusive) will only take place at the Mountphilips Substation Site; construction of the 110kV UGC between the Mountphilips Substation site and the Consented UWF Substation compound will be carried out during the months of September to February inclusive.
PD02	If works at Mountphilips Substation site are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory Hen Harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the entire construction works area boundary. These surveys will be completed prior to the start-up of all construction activities. No works will take place within 2 km of any identified active Hen Harrier nest during the hen harrier breeding season.
PD03	Although no hen harrier roosts are currently known to occur within 1km of UWF Grid Connection, confirmatory surveys will be completed to record any roosting locations within 1km of UWF Grid Connection. Should a hen harrier roost occur within 1km of UWF Grid Connection works, then construction works within 1km of a roost will be limited to the period between 'one hour after sunrise' to 'one hour before sunset' during the Hen Harrier roosting season (October to February inclusive).
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).
PD58	Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season i.e. not during the period of March to August inclusive. This includes hedgerow and scrub removal in addition to hedgerow trimming.

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Project Design Measures – Lower River Shannon SAC	
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).
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. Outside of Mountphilips Substation site, all construction will be restricted to the paved road surfaces or built surfaces along the 110kV UGC.
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, permanent storage berms around the substation compound will be sown with grasses and flower species common to the surrounding vegetation. The permanent storage berms along the new access road will be planted with local provenance native fruiting hedge species, with grasses and native flower species sown along the sides of the berms. 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.
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.
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).
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).

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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). Following works, the sandbags will be removed slowly to ensure the equilibrated restoration of flow character and morphology within the affected reach. Deflector plates will be used if required, to reduce the hydraulic power of the water (These measures will be overseen by an experienced aquatic ecologist). 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.
PD69	All covering of vegetative invasive knotweed infestations with high density polyethylene grass carpet terram will take place, at all identified locations prior to any works commencing on UWF Grid Connection or any other element of the Whole UWF Project. The covering of infestations will be completed on sections seven days in advance of works occurring on those sections. The infestations will be covered so that their full extent plus 1 metre is covered entirely and no vegetation is visible. The covering of these infestations will only be carried out under the direct supervision of an ecologist with prior experience of this type of work i.e. this work cannot be carried out by any general construction staff. No posts will be used to secure the coverings i.e. there will be no ground interference during any of these operations.
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.
Project Design Meausres – Lower River Suir SAC/Clare Glen SAC	
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).

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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 *(does not apply to Lower River Suir SAC)*	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 *(does not apply to Lower River Suir SAC)*	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.

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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.
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). Following works, the sandbags will be removed slowly to ensure the equilibrated restoration of flow character and morphology within the affected reach. Deflector plates will be used if required, to reduce the hydraulic power of the water (These measures will be overseen by an experienced aquatic ecologist). 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.
PD69	All covering of vegetative invasive knotweed infestations with high density polyethylene grass carpet terram will take place, at all identified locations prior to any works commencing on UWF Grid Connection or any other element of the Whole UWF Project. The covering of infestations will be completed on sections seven days in advance of works occurring on those sections. The infestations will be covered so that their full extent plus 1 metre is covered entirely and no vegetation is visible. The covering of these infestations will only be carried out under the direct supervision of an ecologist with prior experience of this type of work i.e. this work cannot be

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	carried out by any general construction staff. No posts will be used to secure the coverings i.e. there will be no ground interference during any of these operations.
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.

8.2.4 EVALUATION OF IMPACTS to European Sites

To avoid duplication of the detailed evaluation of European Sites covered in the Appropriate Assessment Report, only the key findings of the Appropropriate Assessment report are included herein.

As previously referenced, the likely effects of the UWF Grid Connection on European Sites, both alone and cumulative with Other Elements of the Whole UWF Project and Other Projects and Activities is evaluated in the Appropriate Assessment Report for UWF Grid Connection (herein referred to as the NIS).

Conceptual Site Models were used to facilitate the identification of source-pathway-receptor links, between the project and the sensitive Biodiversity receptor - European Sites and is presented in Section 2.7 of the Stage 1 Screening Evaluation (see Volume E). As a result of the Conceptual Site Model exercise, a number of effects were screened in for evaluation at Stage Two of the Appropriate Assessment reporting process, and these impacts, are listed below:

Table 8-17: Summary of Impact Pathways screened in for examination at Stage 2

European Site	Qualifying Interest/Special Conservation Interest screened in for evaluation at Stage 2	Impact examined at Stage 2
Lower River Shannon SAC	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Alluvial Forests (91E0)* (priority habitat)	SAC Pathway 1, 2, 3
	Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]	SAC Pathway 4, 5, 6, 7, 8
Lower River Suir SAC	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Alluvial Forests (91E0)* (priority habitat) Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Yew Woodlands* Taxus baccata woods of the British Isles [91J0] (priority habitat) Old sessile oak woods with Ilex and Blechnum in the British Isles	SAC Pathway 2, 3
	Freshwater Pearl Mussel [1029] White-clawed Crayfish [1092] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106] Otter [1355]	SAC Pathway 5, 6, 7, 8
Clare Glen SAC	Old Oak Woodlands [91A0] Killarney Fern (Trichomanes speciosum) [1421]	SAC Pathway 2, 3
Slievefelim to Silvermines Mountain SPA	Hen Harrier [A082]	SPA Pathway 1, 2, 3

As described in Section 3.4 of the NIS (Volume E), the SAC Pathways 1 to 8 are:

SAC Pathway 1:	Direct effects to **Qualifying Interest habitats** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within the SAC**
SAC Pathway 2:	Indirect Effects to **Qualifying Interest habitats** of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **within the SAC**
SAC Pathway 3:	Indirect Effects to **Qualifying Interest habitats**, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **ex-situ** the SAC
SAC Pathway 4:	Direct effects to **Qualifying Interest species** of an SAC Site (i.e. mortality) **within** or **ex-situ** the SAC
SAC Pathway 5:	Indirect effects to **Qualifying Interest species** of an SAC Site (i.e. disturbance /displacement) **within** the SAC
SAC Pathway 6:	Indirect effects to **Qualifying Interest species** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within** the SAC
SAC Pathway 7:	Indirect effects to **Qualifying Interest species** of the SAC Site (i.e. disturbance /displacement) **ex-situ** to the SAC
SAC Pathway 8:	Indirect effects to **Qualifying Interest species** of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **ex-situ** the SAC.

In order to evaluate the effect of UWF Grid Connection on the integrity of the Lower River Shannon SAC, Lower River Suir SAC, and Clare Glen SAC *(pathway 2 and 3 only*), the impact pathways identified above are examined in detail, through a number of focused impact evaluations, as per:

SAC Pathway 1 SAC Pathway 2 SAC Pathway 3 SAC Pathway 6 SAC Pathway 8	*were examined through these impact evaluations:*	• Decrease in instream aquatic habitat quality • Changes to flow regime • Riparian habitat degradation • Spread of invasive aquatic species
SAC Pathway 4 SAC Pathway 5 SAC Pathway 7	*were examined through these impact evaluations:*	• Direct Mortality of Fish and Aquatic Species • Disturbance or displacement of fish and aquatic species • Direct Mortality of Otter • Disturbance/Displacement of Otter.

The detailed evaluations of the Impact Pathways to the Lower River Shannon SAC, Lower River Suir Sac, and Clare Glen SAC are provided in Sections 3.6, 3.7 and 3.8 of the NIS (Appropriate Assessment Report for UWF Grid Connection (Volume E)).

A **summary of the findings** of that detailed evaluation are presented **below at Sections 8.2.4.1 to 8.2.4.3.**

As described in Section 3.4 of the NIS (Volume E), the SPA Pathways 1 to 3 are:

SPA Pathway 1: Direct effects to Special Conservation Interest Species **within an SPA** (i.e. Disturbance, Mortality)

SPA Pathway 2: Indirect effects to Special Conservation Interest Species **within an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species)

SPA Pathway 3: Indirect effects to Special Conservation Interest Species **ex-situ** an SPA (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, reductions in prey item species, or through disturbance or mortality effects to Special Conservation Interest bird species outside their respective SPA).

In order to evaluate the effect of UWF Grid Connection on the integrity of the Slievefelim to Silvermines Mountain SPA, the impact pathways identified above are examined in detail, through a number of focused impact evaluations, as per:

SPA Pathway 1 SPA Pathway 2 SPA Pathway 3	*were examined through these impact evaluations:*	• Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat • Disturbance/Displacement of foraging Hen Harrier, during the breeding season • Disturbance/Displacement of foraging Hen Harrier outside the breeding season • Reduction in Prey Item Species

The detailed evaluations of the Impact Pathways to the Slievefelim to Silvermines Mountain SPA are provided in Section 3.9 of the NIS (Appropriate Assessment Report for UWF Grid Connection (Volume E)).

A **summary of the findings** of that detailed evaluation are presented **below at Section 8.2.4.4.**

8.2.4.1 Findings of the Appropriate Assessment Report in relation to Lower River Shannon SAC

As per Section 3.6.4 of the Appropriate Assessment Report for UWF Grid Connection:

This section *(Section 3.6)* of the NIS has provided further evaluation of the source-impact pathways identified at Stage 1 Screening as having the potential to result in likely significant effects on the River Shannon SAC and its respective Qualifying Interests screened in for further appraisal.

This has included potential effects on QI habitats and species from decreases in instream aquatic habitat quality, changes to flow regime, riparian habitat degradation, and the spread of invasive species. Potential effects on QI Species examined have included direct mortality of fisheries and other aquatic species, disturbance to or displacement of fisheries, along with mortality of and disturbance to or displacement of Otter. The Qualifying Interests screened in for evaluation at Stage 2 were:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
- Alluvial Forests (91E0)* (priority habitat)
- Atlantic Salmon [1106]
- Sea Lamprey [1095]
- Brook Lamprey [1096]
- River Lamprey [1099]
- Otter [1355]

The above Qualifying Interests both habitats and species have been subject to further examination in respect of their specific sensitivities & Conservation Objectives as to whether the identified pathways/effects can be considered likely to result in adverse effects on European Site Integrity via effects on Conservation Objectives; this has concluded that:

it was concluded that:

- No effects on QI Habitat Alluvial Woodland via reductions in habitat area, distribution or size, altered hydro-logical regime or structure and composition are expected.
- No effects on QI Species (Atlantic Salmon or Lamprey spp.) via reductions in Abundance or distribution, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Habitat Floating River Vegetation via reductions in habitat area, distribution or size, altered hydrological regime, structure and composition, riparian habitat or connectivity are expected.
- No effects on QI Species Otter via reductions in Abundance or distribution, barrier effect, supporting habitat or supporting habitat quality (including prey item abundance) are expected.

Cognisance has been given at this stage to the various Mitigation Measures designed to specifically avoid adverse effects on European Site Integrity, and to in-combination effects with both other project elements of the Whole Upperchurch Windfarm Project in addition to other plans or activities, or consented projects within the defined temporal and spatial overlap for cumulative or in combination effects. Effects both within and without (i.e. ex-situ) the European Site under consideration have been considered.

The evaluation herein has found, that following the examination and analysis presented, **it can be concluded on a reasoned basis, that the proposed development will not result in adverse effects on the Integrity of the River Shannon SAC, in circumstances where no reasonable scientific doubt remains.**

8.2.4.2 Findings of the Appropriate Assessment Report in relation to Lower River Suir SAC

As per Section 3.7.4 of the Appropriate Assessment Report for UWF Grid Connection:

This section *(Section 3.7)* of the NIS has provided further evaluation of the source-impact pathways identified at Stage 1 Screening as having the potential to result in likely significant effects on the River Suir SAC and its respective Qualifying Interests screened in for further appraisal.

This has included potential effects on QI habitats and species from decreases in instream aquatic habitat quality, changes to flow regime, riparian habitat degradation, and the spread of invasive species. Potential effects on QI Species examined have included direct mortality of fisheries and other aquatic species, disturbance to or displacement of fisheries and other aquatic species, along with mortality of and disturbance to or displacement of Otter. The Qualifying Interests screened in for evaluation at Stage 2 were:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
- Alluvial Forests (91E0)* (priority habitat)
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
- Yew Woodlands* Taxus baccata woods of the British Isles [91J0] (priority habitat)
- Old sessile oak woods with Ilex and Blechnum in the British Isles
- Freshwater Pearl Mussel [1029]
- White-clawed Crayfish [1092]
- Sea Lamprey [1095]
- Brook Lamprey [1096]
- River Lamprey [1099]
- Atlantic Salmon [1106]
- Otter [1355]

The above Qualifying Interests both habitats and species have been subject to further examination in respect of their specific sensitivities & Conservation Objectives as to whether the identified pathways/effects can be considered likely to result in adverse effects on European Site Integrity via effects on Conservation Objectives; this has concluded that:

- No effects on QI Habitat Floating River Vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species and fringing habitats are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution or individual woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6340] via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition including increases in non-native species of >1%, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Taxus baccata woods of the British Isles [91J0] via reductions in habitat area, occurrence and distribution, individual woodland size, Altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.

- No effects on QI Species (White-clawed Crayfish) via reductions in baseline occurrence or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat (water) quality are expected.
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Cognisance has been given at this stage to the various Mitigation Measures designed to specifically avoid adverse effects on European Site Integrity, and to in-combination effects with both other project elements of the Whole Upperchurch Windfarm Project in addition to other plans or activities, or consented projects within the defined temporal and spatial overlap for cumulative or in combination effects. Effects both within and without (i.e. ex-situ) the European Site under consideration have been considered.

The evaluation herein has found, that following the examination and analysis presented, **it can be concluded on a reasoned basis, that the proposed development will not result in adverse effects on the Integrity of the Lower River Suir SAC, in circumstances where no reasonable scientific doubt remains.**

8.2.4.3 Findings of the Appropriate Assessment Report in relation to Clare Glen SAC

As per Section 3.8.4 of the Appropriate Assessment Report for UWF Grid Connection:

This section *(Section 3.8)* of the NIS has provided further evaluation of the source-impact pathways identified at Stage 1 Screening as having the potential to result in likely significant effects on the River Suir SAC and its respective Qualifying Interests screened in for further appraisal. The Qualifying Interests screened in for evaluation at Stage 2 were:

- Old Oak Woodlands [91A0]
- Killarney Fern (Trichomanes speciosum) [1421]

The above Qualifying Interests both habitats and species have been subject to further examination in respect of their specific sensitivities & Conservation Objectives as to whether the identified pathways/effects can be considered likely to result in adverse effects on European Site Integrity via effects on Conservation Objectives; this has concluded that:

- No effects on QI Habitat Old Oak Woodlands [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Cognisance has been given at this stage to the various Mitigation Measures designed to specifically avoid adverse effects on European Site Integrity, and to in-combination effects with both other project elements of the Whole Upperchurch Windfarm Project in addition to other plans or activities, or consented projects within the defined temporal and spatial overlap for cumulative or in combination effects. Effects both within and without (i.e. ex-situ) the European Site under consideration have been considered.

The evaluation herein has found, that following the examination and analysis presented, **it can be concluded on a reasoned basis, that the proposed development will not result in adverse effects on the Integrity of Clare Glen SAC, in circumstances where no reasonable scientific doubt remains.**

8.2.4.4 Findings of the Appropriate Assessment Report in relation to Slievefelim to Silvermines Mountain SPA

As per Section 3.9.4 of the Appropriate Assessment Report for UWF Grid Connection:

This section *(Section 3.9)* of the NIS has provided further evaluation of the source-impact pathways identified at Stage 1 Screening as having the potential to result in likely significant effects on the Slievefelim to Silvermines Mountain SPA and its respective Special Conservation Interest screened in for further appraisal.

The Special Conservation Interest screened in for evaluation at Stage 2 were:

- Hen Harrier [A082]

The above Special Conservation Interest species has been subject to further examination in respect of its specific sensitivities & Conservation Objectives as to whether the identified pathways/effects can be considered likely to result in adverse effects on European Site Integrity via effects on Conservation Objectives; and it is concluded that:

- The favorable Conservation condition of the species, or the Integrity of the SPA, will not be adversely affected through any reduction in habitat, range, population status or viability, through permanent or temporary loss of habitat, disturbance or displacement during either the breeding or non-breeding seasons, and any reductions in prey item density.

Cognisance has been given at this stage to the various Mitigation Measures designed to specifically avoid adverse effects on European Site Integrity, and in-combination effects with both other project elements of the Whole Upperchurch Windfarm Project in addition to other plans or activities, or consented projects within the defined temporal and spatial overlap for cumulative or in combination effects. Effects both within and without (i.e. ex-situ) the European Site under consideration have been considered.

The evaluation herein has found, that following the examination and analysis presented, **it can be concluded on a reasoned basis, that the proposed development will not result in adverse effects on the Integrity of Slievefelim to Silvermines Mountains SPA, in circumstances where no reasonable scientific doubt remains**.

8.2.5 Mitigation Measures for Impacts to European Sites

The evaluations in Sections 3.6 to 3.9 of the NIS took into account the Miitgation Measures for the project.

Mitigation measures (Project Design Measures, Best Practice Measures, Surface Water Management Plan, Invasive Species Management Plan, and Traffic Management Plan) prepared specifically for this project have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. The Mitigation Measures are considered to be robust and proven measures which will avoid significant adverse effects to European Sites.

8.2.6 Evaluation of Residual Impacts to European Sites

As described in Section 8.2.4, it is concluded on a reasoned basis, that UWF Grid Connection, alone or in combination, will not result in adverse effects on the Integrity of the European Sites under consideration, having regard to their respective conservation objectives, in circumstances where “no reasonable scientific doubt”.

8.2.7 Application of the Environmental Management Plan for European Sites

The Mitigation Measures will be implemented by the Project Manager and the main Contractor during the construction stage. Implementation of the measures, including the Management Plans, will be carried out under the UWF Grid Connection Environmental Management Plan which is appended to this EIA Report as Volume D.

The UWF Grid Connection Enviornmnetal Management Plan includes a supervisory structure which ensures accountability for all works elements, with requirements for a Project Manager and an independent (of the Contractor) Environmental Clerk of Works along with suitably qualified specialists (including Site Ecologist; Site Hydrologist, mud engineer and invasive species specialist) who will supervise the works and monitor the implementation of Mitigation Measures in order to ensure that sensitive works elements are carried out in a manner which delivers the planned outcomes within the parameters of the impact assessment, as specified.

On this basis, it can be confidently concluded that failures in the mitigation measures and their prescribed outcomes will be avoided.

Nonetheless, the EMP includes contingency measures for unforeseen events, such as oil/fuel spillages, frac-out or water pollution. The Environmental Clerk of Works will have a full time presence on-site during the construction stage, and environmental experts will supervise works at environmentally sensitive locations. This will ensure that any unforeseen significant adverse effects are identified in a timely manner and appropriate remedial action taken immediately. The Environmental Clerk of Works will have a ‘stop-works’ authority to temporarily stop works over part of the site to avoid either an infringement of the Environmental Commitments or an unforeseen adverse environmental event. Works will not be allowed to re-commence until the issue is resolved.

8.2.8 Summary of Impacts to European Sites

In summary it can be concluded that following the examination and analysis presented, it can be concluded on a reasoned basis, that the proposed UWF Grid Connection development will not result in adverse effects on the Integrity of European Sites, in circumstances where no reasonable scientific doubt remains.

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

Impact to European Sites:	**Lower River Shannon SAC**	**Lower River Suir SAC**	**Clare Glen SAC**	**Slieve Felim to Silvermines Mountains SPA**
Evaluation Impact Table (for Other Elements only)	*Appropriate Assessment Report Section 3.6*	*Appropriate Assessment Report Section 3.7*	*Appropriate Assessment Report Section 3.7*	*Appropriate Assessment Report Section 3.9*
Project Life-Cycle Stage *(for Other Elements only)*	Construction Stage	Construction Stage	Construction Stage	Construction Stage, Operational Stage
UWF Grid Connection	**No Adverse Effects on the Integrity of the SAC**	**No Adverse Effects on the Integrity of the SAC**	**No Adverse Effects on the Integrity of the SAC**	**No Adverse Effects on the Integrity of the SPA**
CUMULATIVE IMPACTS:				
UWF Grid Connection in-combination with: Upperchurch Windfarm, UWF Related Works, UWF Replacement Forestry, UWF Other Activities, Milestone Windfarm, Newport Town Park, Rear Cross Quarry, Curraghduff Quarry, Castlewaller Windfarm, Bunkimalta Windfarm, Forestry, Agriculture and Turf-Cutting Activities	No Adverse Effects (in-combination) on the Integrity of the SAC	No Adverse Effects (in-combination) on the Integrity of the SAC	No Adverse Effects (in-combination) on the Integrity of the SAC	No Adverse Effects (in-combination) on the Integrity of the SPA

European Sites

Sensitive Aspect

Biodiversity

Topic

8.3 Sensitive Aspect No.2: National Sites

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

8.3.1 UWF GRID CONNECTION – EVALUATED AS EXCLUDED

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

A total of 3 NHA's and 23 No. pNHAs are found within 15km of the UWF Grid Connection. The location and spatial extent of these NHA's and pNHA's is illustrated on Figure GC 8.3: UWF Grid Connection Study Area for European Sites (Volume C3 EIAR Figures).

The location of the NHAs in the UWF Grid Connection Study Area is described in Table 8-19, the features of interest for these sites are summarized in Table 8-20.

Table 8-19: List of NHA's within the UWF Grid Connection Study Area

Site name and code	Distance from nearest point of UWF Grid Connection
Bleanbeg Bog NHA (Site Code: 002450)	2.2 km north of UWF Grid Connection
Grageen Fen and Bog NHA (Site Code: 002186)	3.2 km southwest of UWF Grid Connection
Mauherslieve Bog NHA (Site Code: 002385)	2.8 m north of UWF Grid Connection

Table 8-20: Features of Interest of NHAs within the UWF Grid Connection Study Area

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

The location of the 23 no. pNHA's in the UWF Gird Connection Study Area are identified on Figure GC 8.3.

National Sites
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Table 8-21: pNHA's located within 15km of UWF Grid Connection

pNHA Site name and code	Distance from UWF Grid Connection
Derrygareen Heath (Site Code: 000931)	0.1km northeast
Clare Glen (Site Code: 000930)	1.5 km south
Glenstal Wood (Site Code: 001432)	2.5 km south
Bilboa And Gortnageragh River Valleys (Site Code: 001851)	2.9 km south
Keeper Hill (Site Code: 001197)	4.3 km north
Ballyvorheen Bog (Site Code: 001849)	5.8 km south
Dromsallagh Bog (Site Code: 001850)	6.5 km south
Nenagh River Gorge (Site Code: 001133)	6.6 km north
Knockanavar Wood (Site Code: 000961)	7.1 km south
Aughnaglanny Valley (Site Code: 000948)	7.7 km south
Inchinsquillib and Dowlings Woods (Site Code: 000956)	8.0 km south
Lough Derg (Site Code: 000011)	8.7 km northwest
Castleconnell (Domestic Dwelling, Occupied) (Site Code: 000433)	8.8 km west
Silvermine Mountains (Site Code: 000939)	9.4 km north
Killavalla Wood (Site Code: 001178)	10.6 km north
Glenomra Wood (Site Code: 001013)	11.2 km west
Cloonlara House (Site Code: 000028)	11.3 km west
Kilbeg Marsh (Site Code: 001848)	11.3 km south
Philipston Marsh (Site Code: 001847)	12 km south
Dundrum (Site Code: 002096)	13.5 km south
Annacarty Wetlands (Site Code: 000639)	13.9 km south
Ballyneill Marsh (Site Code: 001846)	13.9 km south
Dundrum Sanctuary (Site Code: 000950)	14.7 km south

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Topic

8.3.1.2 Evaluation of UWF Grid Connection

UWF Grid Connection was evaluated for its potential to cause impacts to National Sites. The designated National Heritage Area (NHA) sites are Bleanbeg Bog NHA, Grageen Fen and Bog NHA and Mauherslieve Bog NHA.

It is evaluated that there is no potential for effects to these 3 NHAs or their Features of Interest due to:

- UWF Grid Connection will not overlap any NHA boundary;
- the separation distance between UWF Grid Connection and the NHA sites,
- UWF Grid Connection will be located within the carriageway of public roads, and therefore there is an absence of ecological connectivity;
- UWF Grid Connection is located downslope of all 3 NHA sites, and therefore it is evaluated that there are no source pathway links for hydrological effects (as evaluated in Chapter 11: Water, Section 11.1.4) and no likelihood of indirect habitat effects to these NHAs.

It is evaluated that there is no potential for effects to 20 of the 23 pNHAs within 15km or to their Features of Interest due to:

- UWF Grid Connection will not overlap any pNHA boundary,
- the separation distance between UWF Grid Connection and the pNHA sites,
- UWF Grid Connection will be located within the carriageway of public roads, and therefore there is an absence of ecological connectivity.

Of the remaining three pNHA sites, Derrygareen Heath pNHA, which is located 100m north of the UWF Grid Connection, was further evaluated for potential effects by virtue of proximity. It is evaluated however that this pNHA will not be affected by the UWF Grid Connection as it is located upslope from the grid connection. The features of conservation interest for which the site is designated also preclude potential effects seeing as the site is designated for the presence of heathland, which is not sensitive to the construction stage impact pathways identified associated with the proposed project, including noise and vibration. The absence of overlap with this pNHA, and the presence of a 100m buffer of scrub between the proposed UWF Grid Connection and this site further precludes any impacts from construction related loss, disturbance, or emissions.

Clare Glen pNHA, and Bilboa and Gortynageragh River Valleys pNHA, which are located 1.5 km and 2.9 south of the UWF Grid Connection respectively, have downstream connectivity to the proposed grid route via watercourse crossings on the R503 public road. Notwithstanding this source impact pathway, no impacts on these pNHAs are expected due to the implementation of the UWF Grid Connection Project Design Environmental Protection Measures for the protection of downstream water quality.

8.3.1.3 Cumulative Evaluation for the Other Elements of the Whole UWF Project (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 has no potential to cause impacts to National Sites (NHA or pNHA sites) by itself, and therefore 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 evaluations for the Other Elements of the Whole UWF Project are included in Section 8.3.2 to Section 8.3.4 and included in the summary table in Section 8.3.8 in order to show the totality of the project.

8.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.3.2.1 Cumulative Evaluation Study Areas

8.3.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

The UWF Grid Connection has been excluded as a source of impacts to National Sites, primarily due to separation distances between UWF Grid Connection and designated National Sites (NHAs), as well as the absence of impact pathways to proposed National Sites (pNHAs).

8.3.2.1.2 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.

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

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.3.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 8-22 and illustrated on Figure WP 8.3: Whole Project Study Area for National Sites (Volume C3 EIAR Figures).

Table 8-22: Whole Project Cumulative Evaluation Study Area for National Sites

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

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

The evaluation of cumulative impacts to National Sites also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to National Sites with either the UWF 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 Cumulative Evaluations (Section A2.1.4.5).

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

8.3.2.2.1 Potential for Impacts to National Sites

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect National Sites. The results of this evaluation are included in Table 8-24.

The location of the Other Elements in relation to National Sites (NHAs and pNHAs) is illustrated on Figure WP 8.3.

The features of interest of the NHA sites within 15km of the Elements of the Whole UWF Project are described in Table 8-23.

Table 8-23: Features of Interest of National Heritage Sites within 15km of the Whole UWF Project

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

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Site name and code	Feature of Interest
Scohaboy Bog NHA (Site Code: 000937)	Peatlands are the feature of interest for this site. The site is a large raised bog. The Irish Red Data Book species Bird Cherry (Prunus padus) has been recorded from the site (in the past).
Gortacullin Bog NHA (Site Code: 002401)	Peatlands are the feature of interest for the site. The site contains a mosaic of up-land bog and wet heath. Red Grouse has been recorded on the site.

Table 8-24: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Evaluated as excluded: No potential for effects 3 No. NHA sites and 17 No. pNHA sites are located within 15km of the UWF Related Works. The NHA sites include: Mauherslieve Bog NHA, Bleanbeg Bog NHA and Grageen Fen and Bog NHA. Mauherslieve Bog NHA is the closest NHA site, located 4.2km to the west of the UWF Related Works. It is evaluated that there is no potential for effects to these NHAs, or to the pNHAs within 15km or their Features of Interest due to: • The UWF Related Works will not overlap any NHA or pNHA boundary, the nearest site is over 4km away – Mauherslieve Bog NHA 4.2km. All other NHAs or pNHAs are future from the project, including Bleanbeg Bog NHA and Grageen Fen and Bog NHA which are 12.1km and 12.3km from the project respectively. • There is no potential for impacts to the Features of Interest of the National Sites due to distance and absence of any ecological connectivity, or source pathway links for hydrological effects (as evaluated in Chapter 11: Water, Section 11.1.4).
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects 2 No. NHA sites and 9 No. pNHA sites are located within 15km of the UWF Replacement Forestry. The NHA sites include: Bleanbeg Bog NHA and Mauherslieve Bog NHA. Mauherslieve Bog NHA is the closest NHA site, located 6.1km to the west of the UWF Replacement Forestry. It is evaluated that there is no potential for effects to these NHAs, or to the pNHAs within 15km or their Features of Interest due to: • The UWF Replacement Forestry will not overlap any NHA or pNHA boundary, Mauherslieve Bog NHA is the closest NHA site, located 6.1km to the west. • There is no potential for impacts to the Features of Interest of the National Sites due to distance and absence of any ecological connectivity, or source pathway links for hydrological effects (as evaluated in Chapter 11: Water, Section 11.1.4).
Element 4: Upperchurch Windfarm (UWF)	Evaluated as excluded: No potential for effects The Upperchurch Windfarm is within 15km of the Bleanbeg Bog NHA, Mauherslieve Bog NHA, Grageen Fen and Bog NHA and Gortacullin Bog NHA. It is evaluated that there is no potential for effects to these NHAs, or to the pNHAs within 15km or their Features of Interest due to: • The Upperchurch Windfarm will not overlap any NHA or pNHA boundary, Mauherslieve Bog NHA is the closest NHA site, located over 4km to the west, • There is no potential for impacts to the Features of Interest of the National Sites due to distance and absence of any ecological connectivity, or source pathway links for hydrological effects (as evaluated in Chapter 11: Water, Section 11.1.4).

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Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects/Neutral effects: 8 No. NHA sites are and 60 No. pNHA sites are located within 15km of the UWF Other Activities. The NHA sites include: Bleanbeg Bog NHA, Grageen Fen and Bog NHA, Mauherslieve Bog NHA, Woodcock Hill Bog NHA, Moyreen Bog NHA, Carrigkerry Bogs NHA, Scohaboy Bog NHA and Gortacullin Bog NHA. Mauherslieve Bog NHA is the closest NHA site, located 4.8km to the northwest of the closest location of UWF Other Activities. UWF Other Activities overlap a single pNHA (Inner Shannon Estuary – South Shore) where Haul Route Activities will involve street furniture removal and replacement on existing roadway roundabouts along the N69 (Dock Road, Limerick). Neutral effects are likely to this pNHA due the location of the activity within the public road corridor and the absence of drainage or excavation works. No potential for effects to any NHA or pNHA caused by other activities due the absence of construction excavations or drainage works and the separation distances to sites.

8.3.2.3 Cumulative Information: Baseline Characteristics

8.3.2.3.1 Element 2: UWF Related Works

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

8.3.2.3.2 Element 3: UWF Replacement Forestry

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

8.3.2.3.3 Element 4: Upperchurch Windfarm

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

8.3.2.3.4 Element 5: UWF Other Activities

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

8.3.2.3.5 Other Projects or Activities

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

8.3.3 PROJECT DESIGN MEASURES for National Sites

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

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

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

The Project Design Measures outlined in Table 8-25 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **National Sites**.

Table 8-25: UWF Grid Connection Project Design Measures relevant to National Sites

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, permanent storage berms around the substation compound will be sown with grasses and flower species common to the surrounding vegetation. The permanent storage berms along the new access road will be planted with local provenance native fruiting hedge species, with grasses and native flower species sown along the sides of the berms. 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.
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.

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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.
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.

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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).

8.3.4 EVALUATION OF IMPACTS to National Sites

As evaluated in Section 8.3.1, the UWF Grid Connection development has been excluded as a source of impacts to National Sites, primarily due to separation distances between UWF Grid Connection and National Sites.

8.3.5 Mitigation Measures for Impacts to National Sites

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

8.3.6 Evaluation of Residual Impacts to National Sites

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. 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 8.3.1), i.e. **no potential for impacts**.

8.3.7 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 a Invasive Species Specialist.

8.3.8 Summary of Impacts to National Sites

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

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

Table 8-26: Summary of the impacts to National Sites

Impact to Bleanbeg Bog NHA:	**No Impact**
Evaluation Impact Table	*Section 8.3.1 and 8.3.2*
Project Life-Cycle Stage	Construction/Operation
UWF Grid Connection	**No Potential for Impacts - See Section 8.3.1**
Element 2: UWF Related Works	No Potential for Impacts
Element 3: UWF Replacement Forestry	No Potential for Impacts
Element 4: Upperchurch Windfarm	No Potential for Impacts
Element 5: UWF Other Activities	No Potential for Impacts
CUMULATIVE IMPACTS:	
All Elements of the Whole UWF Project	No Potential for Cumulative Impacts

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to National Sites with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.3.2.2).

8.4 Sensitive Aspect No.3: Aquatic Habitats & Species

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

Daireann McDonnell, Chris Cullen and Howard Williams were the main authors of this Section. Please see Sources of Informaiton (Section 8.1.7) and Methodology (Section 8.1.8) for details of the desktop and fieldwork surveys which have informed the evaluation of Aquatic Habitats & Species.

8.4.1 BASELINE CHARACTERISTICS of Aquatic Habitats & Species

8.4.1.1 STUDY AREA for Aquatic Habitats & Species

The study area for Aquatic Habitats & Species in relation to the UWF Grid Connection is described in Table 8-35 and illustrated on UWF Grid Connection Study Area for Aquatic Habitats & Species (Overview and Maps 1 to 3) (Volume C3 EIAR Figures).

Table 8-27: UWF Grid Connection Study Area for Aquatic Habitats & Species

Study Area for Aquatic Habitats & Species	Justification for the Study Area Extents
Watercourses at Crossing Locations	As per Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Scheme, NRA, (2008), CIEEM 2018, EPA 2017, DHPLG 2018, SEPA (2008), Engineering in the Water Environment: Good Practice Guide Construction of River Crossings. WAT-SG-25. Scottish Environment Protection Agency, First edition, April 2008, Mumane, *et al*. (2006) CIRIA technical guidance C648: Control of water pollution from linear construction projects. CIRIA, 2006.

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

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

68 no. watercourse crossings occur within the construction works area boundary associated with the UWF Grid Connection. The majority (63 no.) of which are located in the Lower Shannon & Mulkear River hydrometric area of the River Shannon catchment (crossings W1 to W63), with just 5 No. watercourses located in the River Suir catchment (crossings W64 to W68). Where the 110kV UGC leaves the Mountphilips Substation site, it is entirely located on public roads (W4 to W66) and private paved road (W67 to W68) along its route to the Consented UWF Substation. The watercourse crossings are located in the following EPA sub-catchments: Killeengarrif_SC_010, Newport [Tipperary]_SC_010, Bilboa_SC_010 and the Suir_SC_030.

There are three main watercourses along the route of the 110kV UGC, all of which are within the River Shannon catchment; the Newport River (W7 at the Rockvale Bridge), the Clare (Annagh) River (W36 at the Tooreenbrien Bridge) and the Bilboa River (W53 at the Anglesey Bridge). At these crossing locations all three watercourses are evaluated as containing good salmonid habitat, with good/high biological water quality and good ecological status. Crossing works required for the UWF Grid Connection at these three locations will be in the road pavement within the bridge structures, road level raising works and works to increase the height of parapet walls will all be undertaken from the road surface of the bridge.

The Newport River (W7), Clare River (W36) and Bilboa River (W53), which flow through the study area, were generally 4 to 6 metres wide. The smaller Tooreenbrien Lower which occurs at W33 and Foildarragh which occurs at W49 are c.1-2m wide, and the remaining Class 1 or Class 2 watercourses were generally shallow fast flowing streams which ranged between 0.5m and 1m wide.

All 68 no. watercourse crossing locations were subject to a site visit by an aquatic ecologist and surveyed to evaluate fisheries habitat suitability, riparian and instream habitat and potential for protected aquatic species. In summary the majority of watercourse crossings for UWF Grid Connection are characterised as minor streams and land drains, which have been subject to previous anthropogenic modification (arterial drainage, drainage maintenance, channel modification, abstractions, diversions, etc.). This has resulted in the reduction of ecological status and fisheries potential in the majority of cases throughout the catchments. A number of watercourse crossing points are heavily poached by cattle and in poor condition due to effluent run-off. A summary of the results of the field surveys for the UWF Grid Connection is included in Table 8-28. As per table below, instream works are required at 2 no. watercourses with Fisheries value at Mountphlilips Substation site, with culvert replacement works likely to be required at 1 no. watercourse with Fisheries value.

Table 8-28: Summary of Watercourses within the UWF Grid Connection Study Area

Class	Watercourse Description	Watercourse Crossing ID	Location	Total No. of Water-courses	Confirmed In-Stream Works	*Potentially* re-quiring culvert replacement works
Class 1	Fisheries Value: EPA mapped blue line, major river or stream	W5, W7, W8, W9, W14, W18, W33, W36, W38, W39, W45, W49, W53	Public Roads along 110kV UGC	13	0	**1** *(W14)*
Class 2	Fisheries Value: Headwater Stream Equivalent to EPA blue line but not mapped	W1, W3, W65	Agricultural lands at Mountphilips Substation site Public Roads along 110kV UGC	3	**2** *(W1, W3)*	0
Class 3	Low Fisheries Value: Sub-optimal, heavily vegetated, low or no flow during dry peri-ods	W2, W4, W6, W10, W11, W15, W17, W21, W22, W23, W24, W25, W26, W27, W28, W29, W31, W32, W37, W41, W42, W43, W44, W50, W51, W52, W56	Agricultural lands at Mountphilips Substation site (W2), Public Roads along 110kV UGC	27	1	3
Class 4	No Fisheries Value: Drain, no flow	W12, W13, W16, W19, W20, W30, W34, W35, W40, W46, W47, W8, W54, W55, W57, W58, W59, W60, W61, W62, W63, W64, W66, W67, W68	Public Roads and Private paved road along 110kV UGC	25	0	9
	Total			**68**	**3**	**13**

Watercourse crossing locations, watercourse classifications and the boundary of various sub-catchments are identified on Figure GC 8.4: UWF Grid Connection Study Area for Aquatic Habitats & Species (Overview and Maps 1 to 3). Further details on the site visits and the fisheries appraisals for each watercourse are included in Appendix 8.2: Aquatic Habitats & Species Fieldwork & Survey Results in Volume C4 EIAR Appendices.

Table 8-29: Summary of Watercourse Crossings for UWF Grid Connection (110kV UGC)

Regional Catchment	EPA sub-catchments[1]	EPA - Local Surface Water Bodies[2]	Length of 110kV UGC (km)	No. Water-course crossings	No. Watercourses with Fisheries Value – i.e. Class 1 or Class 2	Watercourses with Fisheries Value which will be subject to new Instream Works	Watercourses with Fisheries Value which will be subject to *potential* Culvert Replacement Works
Shannon	Killeengarrif_SC_010	Ballyard_010	1.3	4	2	2 (W1, W3)	0
	Newport[Tipperary]_SC_010	Newport_040	3.5	5	5	0	0
	Killeengarrif_SC_010	Annagh (Tipperary)_030	4	7	1	0	0
		Annagh (Tipperary)_020	8.4	23	5	0	1 (W14)
	Bilboa_SC_010	Bilboa_010	6.4	18	3	0	0
		Inch (Bilboa)_010	5.4	6	0	0	0
Suir	Suir_SC_030	Clodiagh (Tipperary)_010	1.5	5	1	0	0

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

2Catchment areas as defined in https://gis.epa.ie/EPAMaps/

8.4.1.3 Importance of Aquatic Habitats & Species

As above, there are three principal rivers which will be crossed by the UWF Grid Connection located in the Lower Shannon & Mulkear hydrometric area of the River Shannon catchment. At the crossing locations, the Newport River (W7) and the Bilboa River (W53) are designated within the Lower River Shannon SAC. The Clare (Annagh) River crossing (W36) is located approximately 9.5 km upstream of the Lower River Shannon SAC designation on this watercourse. This European Site designation terminates at the downstream point of impassable falls, which creates a migratory barrier for Atlantic Salmon and Sea lamprey. Although these three rivers are not listed as Salmonid Waters under Schedule 1 of the S.I. No. 293/1988, all are designated within the Lower River Shannon SAC within the wider study area and support nationally important Atlantic salmon (within the passable reaches) and resident Brown trout populations. Furthermore, all three watercourse crossings on the Newport, Bilboa and Clare (Annagh) Rivers comprise internationally important aquatic instream habitat for additional water-dependant Annex II species, including Brook lamprey and Otter. The Bilboa River and the Newport River are part of the Lower River Shannon SAC and are therefore of International Importance. The Clare (Annagh) River at the crossing point is evaluated as being of National Importance, taking account of the salmonid fisheries value (resident Brown trout); in addition to its connectivity to the Lower River Shannon downstream; and with cognisance of the water-dependant habitats and species it supports.

In the Suir catchment, the Clodiagh (Tipperary) sub-catchment is identified as a Freshwater Pearl Mussel (FPM) sensitive catchment[13], containing other **extant** populations of this Annex II listed species. The Clodiagh River population in north Tipperary is not designated as a qualifying interest within the Lower River Suir SAC; where the conservation objectives for the Lower River Suir SAC relate specifically to the Clodiagh (Portlaw) FPM population[14], which is connected to the River Suir main channel in Co. Waterford. In the Clodiagh River (County Tipperary), extant Freshwater pearl mussel populations are located downstream of the watercourse crossings, within the SAC boundary and at a distance of approximately 17km from the subject development.

The upper reaches of the Suir catchment within the study area are characterised as land drains (W64, W66, W67 and W68) with one watercourse crossing (W65) identified as providing important juvenile habitat for Atlantic salmon, contiguous with the populations within the Lower River Suir SAC downstream; resident Brown trout populations are also supported within this watercourse. Therefore, the unnamed headwater stream of the Clodiagh River at W65 is evaluated as of 'Good' status with 'Good' biological water quality and as being of National Importance.

Minor watercourses within the UWF Grid Connection study area which were identified as having fisheries potential (Class 1 or Class 2) are evaluated as being of local importance (higher value).

Those watercourses and drains with sub-optimal or no fisheries value (Class 3 or Class 4) are evaluated as being of local importance (lower value), and subsequently scoped out from further evaluation in the impact assessment, in line with guidance (EPA, 2017).

Furthermore, as evaluated in Chapter 11 Water, a suite of water quality protection measures will be implmemented during the construction of UWF Grid Connection and these measures will include all watercourses, regardless of their fisheries value. No effects greater than 'Imperceptible' are likely to any of the watercourses in proximity to the development.

8.4.1.4 Sensitivity of Aquatic Habitats & Species

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

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

[14] NPWS (2017) Conservation Objectives: Lower River Suir SAC 002137. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

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

The UWF Grid Connection is located in the Killeengarrif_SC_010, Newport[Tipperary]_SC_010, and Bilboa_SC_010 sub-catchments which are part of the Lower Shannon & Mulkear hydrometric area of the River Shannon catchment, and the Clodiagh (Tipperary)_010 local waterbody catchment of the Suir_SC_010 sub-catchment of the River Suir catchment. Both the Newport River and Clodiagh River catchments were classified as 'catch and release' by IFI in 2019 (Salmon Angling Regulations: Management of the Wild Salmon Fishery 2019) for the conservation of Atlantic Salmon stocks, indicating the ongoing pressures on the salmon populations in these catchments. There is an ongoing and persistent decline in Atlantic Salmon stocks in Irish freshwaters overall, pertaining specifically to the European Sites which list this species as a qualifying interest (NPWS, 2013). Pressures and threats affecting the freshwater habitat of salmon correlate directly to those pressures affecting other aquatic ecological interests including lamprey species, aquatic invertebrates and other salmonids (siltation; channelization; drainage maintenance; invasive species and disease vectors; and direct/diffuse pollution from agriculture, forestry and direct discharges). It is noted that morphological pressures such as barriers to movement or channelisation may have varying adverse significance on different species; for example, affecting salmon differently to lamprey species. As per Chapter 11 – Water, the Water Framework Directive status of the surface water bodies at the study area is typically Good. The majority of the waterbodies 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. 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.

8.4.1.6 Receiving Environment (the Baseline + Trends)

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

8.4.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.4.2.1 Cumulative Evaluation Study Areas

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 Aquatic Habitats & Species	Justification for the Study Area Extents
Watercourses at Crossing Locations	As per Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Scheme, NRA, (2008), and CIEEM 2016

The study is illustrated on Figure CE 8.4: UWF Grid Connection Cumulative Evaluation Study Area for Aquatic Habitats & Species (Overview and Maps 1 to 3).

8.4.2.1.1 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 8.4.2.2.1 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 on Table 8-30 and illustrated on Figure WP 8.4: Whole Project Study Area for Aquatic Habitats & Species (Overview and Map 1) (Volume C3 EIAR Figures).

Table 8-30: Whole Project Cumulative Evaluation Study Area for Aquatic Habitats & Species

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Watercourse Crossing Locations and sub-catchments	As per Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Scheme, NRA, (2008) Professional Judgement
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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

The evaluation of cumulative impacts to Aquatic Habitats & Species also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Aquatic Habitats & Species with either the UWF 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 Cumulative Evaluations (Section A2.1.4.6).

The results of this scoping exercise are that: consented Newport Town Park, consented Castlewaller Windfarm (and potential grid connection), and the potential Bunkimalta Windfarm (including the consented grid connection), have been scoped in for evaluation of cumulative effects to Aquatic Habitats & Species on the basis of potential interactions with the aquatic environment.

8.4.2.2.1 Potential for Impacts to Aquatic Habitats & Species

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Aquatic Habitats & Species. The results of this evaluation are included in Table 8-31.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure WP 8.4. The baseline character of the areas around these Elements is described in Section 8.4.2.3

Table 8-31: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects: The UWF Replacement Forestry is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. One Class 1 stream flows through the UWF Replacement Forestry lands. Environmental protection measures which form part of the design of the UWF Replacement Forestry include planting by hand, no use of pesticide or fertilizer, no refuelling or storage of fuels onsite, a 10m water setback area, and the planting and management of the site in accordance with best practice. • Neutral habitat deterioration impacts arising from the UWF Replacement Forestry, as there is no requirement for instream works and no sources of significant sediment creation as planting will be carried out by hand. • Neutral disturbance or displacement effects, as there is no requirement for instream works, and due to the scale of the works with planting being carried out by hand without the use of machines, and low levels of maintenance associated with the growth stage. • There is no potential for habitat quality impacts, as the riparian strips/grassland adjacent to the existing watercourse will be maintained as part of the forestry layout as a water quality protection measure. • There is no potential for the planting works to spread invasive species, as there are no instream works required.

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	• There is no potential for aquatic habitat degradation due to nitrogen deposition, as the new forestry will be a permanent native woodland, therefore no tree-felling/harvesting will be carried out. • There is no potential for acidification effects during the growth stage, as the UWF Replacement Forestry will be deciduous in nature. • There is no risk of pollution events as herbicide or fertilizers will not be used and the use of machinery will be minimal. • No potential for impacts to aquatic habitat quality arising from the spread of invasive species, as there are no instream works or activities adjacent to watercourses required. • There is no risk of aquatic habitat degradation (as a result of nitrogen deposition) as commercial tree felling will not be required – UWF Replacement Forestry will be a permanent native woodland.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: no potential for effects: The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. • There is no potential for aquatic habitat effects as there are no instream works or sediment creating activities adjacent to watercourses required as a result of UWF Other Activities (including Overhead Line Activities, Haul Route Activities, and the Upperchurch Hen harrier Scheme). • No potential for disturbance effects to aquatic receptors due to the small scale of activities and no instream activities in Class 1 or Class 2 watercourses. The Upperchurch Hen harrier Scheme will include planting of 1.4km of woody scrub species along riparian corridors and fencing of watercourse corridors to prevent access to the watercourses by livestock, which will enhance the quality of riparian habitats. • No potential for impacts to aquatic habitat quality arising from the spread of invasive species, as there are no instream works required as a result of UWF Other Activities, and the best practice biosecurity measures to prevent the spread of invasive species will be implemented for all activites; as set out in Chapter 5, Appendix 5.6 (Description of UWF Other Activities) • No potential for impacts to aquatic habitats due to tree felling, as no tree felling of conifer plantations is required.
Other Projects or Activities	
Newport Town Park (consented) Castlewaller Windfarm (consented windfarm & potential grid connection) Bunkimalta Windfarm (potential windfarm & consented grid connection)	Yes, included for the evaluation of cumulative effects relating to decreases in instream habitat quality and the spread of non-native invasive species. Excluded from evaluation of cumulative effects in relation to the following impacts- changes in flow regime, disturbance/displacement of fish or aquatic species, and riparian habitat degradation, as any cumulative effects will be Neutral due to absence of spatial overlap on physical habitat precluding direct cumulative effects. Indirect cumulative effects will be negated due to physical and spatial isolation, i.e. separation distance.

8.4.2.3 Cumulative Information: Baseline Characteristics – Context & Character

In respect of aquatic habitats and aquatic species, the existing environment in relation to cumulative effects comprises surface water bodies (predominantly the upper reaches of tributaries) draining to the Killeengarrif_SC_010, Newport [Tipperary]_SC_010 and Bilboa_SC_010 subcatchments within the Lower River Shannon & Mulkear River hydrometric area of the River Shannon catchment and the Suir_SC_030 subcatchment in the River Suir catchment.

8.4.2.3.1 Element 2: UWF Related Works

UWF Related Works will involve 32 no. watercourse crossings. The majority of watercourse crossings are located off-road in agricultural and forestry lands. The majority of the footprint of the UWF Related Works is located within the River Suir regional catchment – mainly in the Clodiagh (Tipperary)_10 local water body in the Suir_SC_030 sub-catchment, with the remainder within the Owenbeg_010 local water body (also part of the Suir_SC_030) and the Multeen (East)_010 local surface water body which is within the Multeen(East)_SC_010 subcatchment. A small proportion of the footprint of the UWF Related Works is located in the Bilboa_SC_010 sub-catchment of the River Shannon.

UWF Related Works WW22 and UWF Grid Connection W65 are crossing points of the same watercourse.

Table 8-32: Summary of Watercourses within the UWF Related Works Study Area

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

Table 8-33: Summary of Regional and Local Hydrology at the UWF Related Works Areas

Regional Catchment	EPA sub-catchment	EPA Local Surface Water Bodies	Internal Cable (km)	HW works	RWR works	No. WC Crossings
Suir	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
Suir	Multeen[East]_SC_010	Multeen (East)_010	0.88	-	-	0
Shannon	Bilboa_SC_010	Inch (Bilboa)_010	1.45	HW7 to HW10	-	1
		Bilboa_010	0.29	-	-	0

HW Works – Haul Route Works, RWR – Realigned Windfarm Roads

Watercourse crossing locations, watercourse classifications and the boundary of various sub-catchments are identified on Figure WP 8.4: Whole Project Study Area for Aquatic Habitats & Species (Overview and Map 1), (Volume C3 EIAR Figures).

8.4.2.3.2 Element 3: UWF Replacement Forestry

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

8.4.2.3.3 Element 4: Upperchurch Windfarm

The area of the Upperchurch Windfarm is predominantly situated in the River Suir regional catchment (Clodiagh (Tipperary) River and Multeen River sub-catchments).

The remaining proportion of the footprint of the Upperchurch Windfarm is located in the Bilboa River sub-catchment of the River Shannon.

As per the EIS 2013, the Upperchurch Windfarm involves 1 no. watercourse crossings, this watercourse is included in Table 8-32 as WW2 (Class 2).

Consideration of the Passage of Time: A comparison of EPA monitoring data for 2012 and 2017 demonstrates that water quality in the catchment into which the windfarm site drains, has remained stable. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this 2019 EIAR.

8.4.2.3.4 Element 5: UWF Other Activities

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

8.4.2.3.5 Other Projects or Activities:

Newport Town Park (proposed): A recently consented public park on lands immediately adjacent to the Newport River within the urban area of Newport town. The new park will incorporate children's play area, play equipment, zip wire, outdoor gym equipment, pump track, multi-use games area, recreational walkways, seating, signage, interpretive panels, landscaping and car parking. In relation to aquatic habitats and species, the Newport Town part is located within the Newport (Tipperary)_SC_010 sub-catchment, downstream of the UWF Grid Connection development. The development will involve excavations and groundworks on lands immediately adjacent to the Newport River and overlaps the boundary of the Lower River Shannon SAC. However, there will be no instream works, nor works within 5m, of the Newport River. Sediment control, water quality protection, and invasive species control measures will be implemented, as conditioned by planning consent.

Consented Castlewaller Windfarm (and potential grid connection): The consented 16-turbine windfarm is entirely located within the Newport (Tipperary)_SC_010 sub-catchment, all upstream of the UWF Grid Connection development. The construction of the Castlewaller Windfarm and potential grid connection will involve both instream works and works in close proximity to watercourses. The grid connection for Castlewaller Windfarm is neither currently consented nor proposed. For the purposes of this evaluation, the potential route of this grid connection is assumed to be predominantly on public roads, including the L6009-0, just east of Newport Town. The L6009-0 will also be used for the UWF Grid Connection 110kV UGC. A potential site entrance via an existing forestry entrance off the R503 (along the UWF Grid Connection route) is also evaluated herein. Both of these potential works (i.e. grid connection and site entrance works) occur in

the Kileengarrif_SC_010 and Newport (Tipperary)_SC_010 sub-catchments. Although Castlewaller Windfarm is not likely to be constructed during the same period as UWF Grid Connection, there is some possibility that this windfarm could be built during the same period as UWF Grid Connection, and therefore the Castlewaller Windfarm project is included in the cumulative evaluation on a precautionary basis.

Potential Bunkimalta Windfarm (and consented grid connection): Due to the recent annulment of the Bunkimalta Windfarm planning permission, it is not expected that the potential Bunkimalta Windfarm will be constructed at the same time as UWF Grid Connection, this potential project and its associated gird connection are nonetheless included in the cumulative evaluation on a precautionary basis. There are no current proposals for a windfarm in the Bunkimalta/Keeper Hill area, however for the purposes of this report a potential windfarm in a similar location and of a similar size as the previous 2013 application is evaluatated herein. It is assumed that the windfarm will involve excavations, groundworks and instream works within the Kileengarrif_SC_010 and Newport (Tipperary)_SC_010 sub-catchments. There is an already consented grid connection for a windfarm in the Bunkimalta/Keeper Hill area, which is predominately within the public road corridor to Nenagh town. This grid connection involve works within the Kileengarrif_SC_010 and Newport (Tipperary)_SC_010 sub-catchments, though it is not located close to the UWF Grid Connection. The potential Bunkimalta Windfarm is located upstream of the UWF Grid Connection only.

8.4.3 PROJECT DESIGN MEASURES for Aquatic Habitats & Species

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

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

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

The Project Design Measures outlined in Table 8-34 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Aquatic Habitats & Species**.

Table 8-34: UWF Grid Connection Project Design Measures relevant to Aquatic Habitats & Species

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).
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.
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.
PD51	The sections of the 110kV UGC trench within the R503, in the central part of the 110kV UGC where the adjacent lands comprise predominantly peaty soils, will be lined with a geotextile membrane which will provide support to the cables trench and the road structure.
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

Aquatic Habitats & Species

Sensitive Aspect

	the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice Measures are followed.

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

Topic **Biodiversity**

8.4.4 EVALUATION OF IMPACTS to Aquatic Habitats & Species

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

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

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

Table 8-35: List of all Impacts included and excluded from the Impact Evaluation Table sections

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

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

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

8.4.4.1 Impact Evaluation Table: Decrease in instream aquatic habitat quality

Impact Description:	
Project Life Cycle Stage:	Construction stage

Impact Source: instream works; culvert replacement works; parapet works; movement of soils and machinery; excavation works; use of hydrocarbons & cement-based compounds; reinstatement works

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

Impact Pathway: Soils; Surface water, water flowpaths

Impact Description: Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community.

Instream works at some watercourses will require direct excavation of the banks and bed of the watercourse, which can change the physical character of the watercourse and has the potential to degrade the quality of the baseline habitat which supports the structure, function and diversity of aquatic species.

Water quality effects due to sedimentation: Erosion and deposition are natural process in watercourses[15], varying naturally throughout the year. However, additional sediment contributions entering the watercourse, such as from construction works in, adjacent to or upstream of individual watercourses, can have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels by sediment causing mortality impacts for salmonid eggs (affecting recruitment) and interfering with invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works.

In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

Impact Quality: Negative

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

Element 1: UWF Grid Connection – direct/indirect impact

General Impact Magnitude:

Of the 68 No. watercourse crossings required for the UWF Grid Connection, 16 No. have been evaluated to have fisheries value. Of these 16 No. watercourses, 2 No. watercourses with fisheries value at Mountphilips Substation site (W1, W3) will be subject of instream works and 1 No. watercourse with fisheries value along the 110kV UGC with fisheries value (W14) will be subject to *potential* culvert replacement works. Each of these watercourses were classed as minor 1st order streams during watercourse surveys.

Overall, the magnitude of the effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and water quality due to instream works at W1 and W3, and due to culvert replacement works at W14 has been evaluated as having a Negligible magnitude with regard to availability, diversity and quality of habitat supporting aquatic species. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water (Negligible magnitude/Imperceptible significance impact taking account of instream works). The potential for decreases in aquatic habitat quality due to additional sedimentation or contamination by fuels, oils or cement is evaluated as having a Negligible magnitude, in line with the Negligilbe Impact magnitude and Imperceptible impact signicance presented for instream works, sedimentation and contamination effects in Chapter 11 Water.

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

The remaining 13.No watercourses with fisheries value will not require instream works or culvert replacement works. This includes the crossing of the Newport River at W7, the crossing of the Clare (Annagh) River at W36 and the crossing of the Bilboa River at W53 – the 110kV UGC will be installed within the existing bridge structures. The installation of the 110kV UGC at the other watercourses with fisheries value (W5, W8, W9, W18, W33, W38, W39, W45, W49, W65) will not involve instream works as the cables will be installed either under or over the existing structures. Therefore the potential for decreases in aquatic habitat quality at the remaining 13 No. watercourses only relates to sources of additional sedimentation or contamination by fuels, oils or cement. The potential for decreases in aquatic habitat quality due to additional sedimentation or contamination by fuels, oils or cement is evaluated as having a Negligible magnitude, in line with the Negligilbe Impact magnitude and Imperceptible impact signicance presented for instream works, sedimentation and contamination effects in Chapter 11 Water.

Significance of the Impact: Slight to Moderate at watercourses with fisheries value requiring in-stream works or culvert replacement works, Slight Impacts at Sub-Catchment level

Rationale for Impact Evaluation:

- Application of comprehsive water quality protection measures for UWF Grid Connection through the EMP with supervision by supervised by a member of CIEEM and the Institute of Fisheries Management during all in-stream works and culvert replacement works (i.e. whether fisheries value or not);
- In-stream works at W1,W3 and culvert replacement works at W14 will only be undertaken during the IFI specified period (July – September) (Project Design Measure), which puts works outside of key sensitivity periods for the aquatic receptors. Flow conditions during this period are also likely to be lower, with lower relative contributions from surface water run-off;
- The in-stream works will not be undertaken without isolation of flow within the watercourse, and the removal of fish within the isolated section, prior to the in-stream works commencing (Project Design Measure).;
- Implementation of the Project Design Measures for Water Quality protection (PD17 to PD50) through the Surface Water Management Plan for UWF Grid Connection
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design);
- The spatial extent of effects to the watercourse channel will occur within the footprint of any works at potential culvert replacement locations;
- The frequency of such an event is once for any culvert replacement works;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat.
- Impacts to the watercourse channel are temporary and reversible. The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible; and
- It's likely only between 100 – 300m of the trench will be excavated in any day with only 1 – 3 watercourse crossings being completed in any one day (assumed 3 work crews). Therefore, taking account of the temporary nature of the works within the catchment, all effects will be brief to temporary in nature and reversible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2). The potential for cumulative effects with the Other Elements of the Whole UWF Project relates to those watercourses with fisheries value which will be subject to instream works for both UWF Grid Connection and for Other Elements, with cognisance of works proposed within adjacent tributaries of the affected catchments, but which may not be occurring on the same individual watercourses.

Neither Upperchurch Windfarm, nor UWF Replacement Forestry, nor UWF Other Activities will require any instream works, and it is therefore evaluated that any cumulative impacts directly or indirectly affecting instream aquatic habitat quality (water quality contamination or sedimentation) will be negligible, with reference to interactions between these Elements and the UWF Grid Connection. This evaluation takes cognisance of the Surface Water Management measures in place for Upperchurch Windfarm.

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UWF Related Works within the Shannon catchment will cause limited construction-related effects as UWF Related Works will not require any instream works in the Bilboa_SC_010 sub-catchment, and is not located in either the Killeengarrif_SC_010 or Newport_SC_010 sub-catchments, and cumulative impacts to instream aquatic habitat quality will be negligible. The potential for cumulative effects with UWF Related Works therefore relates to the Suir_SC_030 sub-catchment, where UWF Related Works also occurs and will require instream works.

In the Suir_SC_030 sub-catchment, the UWF Grid Connection does not require any instream works, or culvert replacement works to existing culverts on watercourses with fisheries value; while the UWF Related Works will involve instream works on five watercourses (with fisheries value) within the Suir_SC_030 sub-catchment. One of the UWF Related Works (WW22) instream works will be within c.20m of UWF Grid Connection crossing W65 (which will not require any culvert replacement works as it is within the road pavement). The temporal extent of both works components is short-term and water quality contamination effects arising from the UWF Grid Connection works are restricted to the duration of the cable trench works only, in the road corridor, and will not overlap temporally with the UWF Related Works at this watercourse crossing point along this road segment (Project Design). In addition, the spatial extent of any potential physical cumulative effects will occur within the footprint of the UWF Related Works instream works, and also downstream within the zone of sediment transport. Therefore, the zone of cumulative effects extends from the watercourse crossing points to the lower end of any waterbody. Due to the limited spatial extent of works associated with the UWF Grid Connection, it is evaluated that the magnitude of any cumulative impacts with regard to interactions with the UWF Related Works to instream aquatic habitat quality will be **negligible**.

There is potential for cumulative effects with the Bunkimalta Windfarm and Castlewaller Windfarm (and potential grid connection) (should they be constructed during the same period as UWF Grid Connection), the potential for cumulative effects relates to the Newport_SC_010 sub-catchment and the Killeengarrif_SC_010 sub-catchment. Due to the large size of both of these catchments, the limited extent of instream works associated with UWF Grid Connection, the large upstream distance of Bunkimalta Windfarm works, the temporary duration of these works, and the implementation of surface water management plans for both windfarms, the cumulative impact magnitude is evaluated as Negligible to Slight (in line with the cumulative magnitude evaluated in the Water chapter).

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

Rationale for Impact Evaluation:

- In-stream works or culvert replacement works in watercourses with fisheries value for UWF Grid Connection will only occur in the Killeengarrif_SC_010 sub-catchment and will only be undertaken during the IFI specified period (July – September) (Project Design Measure);
- No instream works or culvert replacement works in watercourses with fisheries value are required for UWF Grid Connection on watercourses of fisheries value arising from the UWF Grid Connection in the Newport_SC_010, the Bilboa_SC_010 or the Suir_SC_030 sub-catchments.
- Application of comprehsive water quality protection measures for UWF Grid Connection through the EMP with supervision by supervised by a member of CIEEM and the Institute of Fisheries Management during all in-stream works and culvert replacement works (i.e. whether fisheries value or not);
- In-stream works in the Suir_SC_030 sub-catchment only relate to UWF Related Works where works will occur on small headwater streams (5 No.) during the period July to September and the in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing;
- The upstream separation distance to Bunkimalta Windfarm and the location of Castlewaller Windfarm turbines in the Newport SC_010 sub catchment where there are no instream or culvert replacement works required on any watercourse for the UWF Grid Connection, and the location of their respective grid connections predominately on roadways, with works spread over two catchments, in addition to the relatively large surface water catchment area of the Newport_SC_010 or Killeengarrif_SC_010 sub-catchments, and the temporary duration of construction works;
- There will be no direct discharge of pumped water into watercourses during the works (Project Design);
- The spatial extent of effects to the watercourse channel is limited to the footprint of instream works or culvert replacement works, and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat, and
- Impacts to the watercourse channel are temporary and reversible with reinstatement.

Topic **Biodiversity**

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: Works at, or in close proximity to, watercourses have potential to cause decreases in instream habitat quality directly through instream works and indirectly through sediment laden/contaminated runoff into the watercourse. There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works. 31 no. of the total 32 no. crossings are located within the Suir_SC_030 sub-catchment and 1 no. in the Bilboa_SC_010 sub-catchment. Of these 31 no. crossings the Suir_SC_030 sub-catchment, in-stream works will be required at 25 no. of these locations - 5 No. of which were evaluated as having fisheries value. The 1 no. watercourse crossing in the Bilboa_SC_010 will not require any instream works. The spatial extent of such effects will occur within the footprint of the instream works (direct effects), and also downstream of construction works (indirect water quality effects) within the zone of sediment transport. The effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character due to instream works has been evaluated as a Slight to Moderate adverse impact on availability, diversity and quality of habitat supporting aquatic species. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water (taking account of instream works).
Significance of the Impact: Imperceptible to Moderate in the local context
Rationale for Impact Evaluation: • In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses ((UWF Related Works Project Design Measure)); • The Class 1 and Class 2 watercourses where in-stream works are required (5 No.) are largely small headwater streams and therefore are likely to have relatively low flows during July to September; • The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing. This will be completed by over pumping, flume (pipe) or channel diversion methods (UWF Related Works Project Design Measure); • There will be no direct discharge of pumped water into the watercourse during the works (UWF Related Works Project Design Measure)); • The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat, and • Impacts to the watercourse channel are temporary and reversible with reinstatement. • The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.4.2.2.1.*
Element 4: Upperchurch Windfarm
Impact Magnitude: There is 1 no. watercourse crossing within the Upperchurch Windfarm Site, evaluated as having fisheries value (Class 1, WW2). This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Baseline conditions indicated that the aquatic species were present year-round, and works in close proximity to this watercourse were evaluated as being of high magnitude for aquatic species. However, it was identified that significant impacts were not probable/not likely post-mitigation. The 2013 EIS concludes that water quality effects will not be significant
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required; • All effects were evaluated as reversible and temporary in the short-term and impacts were associated with construction phase works.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.4.2.2.1.*

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Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Projects: Newport Town Park, Castlewaller Windfarm, Bunkimalta Windfarm

Impact Magnitude:
Newport Town Park, along with the consented Castlewaller Windfarm, and part of the potential Bunkimalta Windfarm (*assumed*) are located within the Newport (Tipperary)_SC_010. The potential route of the Castlewaller grid connection (assumed) and a small section of the consented Bunkimalta Windfarm will occur along the public road network through the Kileengarriff_SC_010 subcatchment.
While Newport Town Park is located on lands immedicately adjacent to the Newport River, no instream works, or works within 5m of the river will occur. Instream works and works (including earthworks) in close proximity to watercourses will be associated with the two windfarm developments. However sediment and erosion control measures are conditioned/assumed to form part of any future planning application. It is also assumed that any requirements for new or replacement watercrossing structures will be sized to adequately cope with flood events, and enable the free passage of fish.

Significance of the Impact: Not Significant residual effect

Rationale for Impact Evaluation:
- Implementation of best practice during construction works and the development of these projects in accordance with planning conditions

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

Whole UWF Project Effect

Magnitude: The watercourse crossing works required for the UWF Grid Connection (68 No. total) are largely located within the River Shannon catchment (63 No.) while the watercourse crossings required for the Upperchurch Windfarm (1 No.) and UWF Related Works (32 No. total) are largely located in the Suir_SC_030 sub-catchment. For the Whole UWF Project, a potential decrease in aquatic habitat quality due to instream/culvert replacement works is identified at a total of **8 No**. watercourses evaluated as having fisheries value – 3 no. for UWF Grid Connection, and 5 no. for UWF Related Works. The spatial extent of habitat quality effects arising from Whole UWF Project impacts, due to instream works or water quality contamination, will potentially occur within the footprint of the instream/culvert replacement works, taking account of Project Design measures and implementation of mitigation measures stipulated for individual Project Elements. These effects will be dispersed between two regional catchments and within several local sub-catchments. Impact range is located downstream of the lowest point in the waterbody where Whole UWF Project works are required, with reference to the zone of sediment transport. It is evaluated that the cumulative impact magnitude will be Imperceptible to Moderate.

Significance of the Whole Project Effect: Imperceptible to Moderate in the local context

Rationale for Impact Evaluation:
- The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species downstream.
- The low number of watercourses (8 No. in total) with fisheries value and subject to instream/culvert replacement works.
- the location of works in two separate regional catchments;
- the linear nature of the UWF Grid Connection 110kV UGC works over a large c.23km latitudinal distance;
- The spatial extent of effects to watercourse channels will occur within the footprint of the instream works,
- The once off frequency and brief to temporary duration of works within or adjacent to the aquatic habitat.
- Impacts at the works site are temporary and reversible; however, any reduction in habitat quality due to potential downstream siltation effects are considered to be short-term to temporary and not reversible.

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

Cumulative Impact Magnitude:

In relation to cumulative effects within the Killeengarriff_SC_010 sub-catchment; Approximately 13.7km of the 110kV UGC and the Mountphilips Substation site and 5 No. of the 16 No. consented Bunkimalta Windfarm turbines and 0.2km of the consented grid connection for Bunkimalta Windfarm, and 9.6km of the potential grid connection route for Castlewaller Windfarm are located within the Killeengarriff_SC_010. There are no other elements of the Whole UWF Project requiring instream works, or contributing to aquatic habitat deterioration (water quality contamination or deterioration) within this sub-catchment.

In relation to cumulative effects within the Newport (Tipperary)_SC_010 sub-catchment; Approximately 3.5km of the 110kV UGC, along with 11 No. of the 16 No. consented Bunkimalta Windfarm turbines and 6.4km of the potential consented Bunkimalta Windfarm grid connections, and all of the Castlewaller Windfarm and 4.8km of the potential Castlewaller Windfarm grid connection and all of the Newport Town Park are located within the Newport (Tipperary)_SC_010 sub-catchment. There are no other elements of the Whole UWF Project requiring instream works, or contributing to aquatic habitat deterioration (water quality contamination or deterioration) within this sub-catchment.

The remaining elements of the Whole UWF Project are located in the Bilboa River sub-catchment and in the Suir_SC_030 sub-catchment and are therefore spatially distant and hydrologically separated from any cumulative interactions due to instream works with Other Projects and Activities.

The magnitude of cumulative impact is Negligible to Low, taking account of the impact evaluations for the Whole UWF Project and those of the Other Projects and Activities identified in the wider study area, with cognisance of the aquatic sensitivities in the affected catchments.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species downstream.
- The low number of watercourses (8 No. in total) with fisheries value and subject to instream/culvert replacement works.
- the location of works in two separate regional catchments;
- the linear nature of the UWF Grid Connection 110kV UGC works over a large c.23km latitudinal distance;
- The spatial extent of effects to watercourse channels will occur within the footprint of the instream works,
- The once off frequency and brief to temporary duration of works within or adjacent to the aquatic habitat.
- Impacts at the works site are temporary and reversible; however, any reduction in habitat quality due to potential downstream siltation effects are considered to be short-term to temporary and not reversible.the location of the grid connections for Bunkimalta Windfarm (consented) and Castlewaller Windfarm (potential) predominately on existing forestry/public roads within the catchment;
- The large surface water catchment area of the Killeengarriff_SC_10 sub-catchment (122km^2) and Newport (Tipperary)_SC_010 sub-catchment(95km^2);
- The relatively large upstream distance of the potential Bunkimalta Windfarm site (~10km) from the 110kV works;
- The absence of instream works required for the Newport Town Park;
- Sediment Control Plans expected to be in place at the potential Bunkimalta Windfarm and associated consented grid connection, consented Castlewaller Windfarm (and potential grid connection, as per best practice) and consented Newport Town Park project.
- the location of the grid connections for Bunkimalta Windfarm (consented) and Castlewaller Windfarm (potential) predominately on existing forestry/public roads within the catchment;

8.4.4.2 Impact Evaluation Table: Changes to Flow Regime

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: instream works; culvert replacement works; movement of soils and machinery; excavation works; new crossing structures

Cumulative Impact Source: Instream works; new crossing structures;

Impact Pathway: Surface water;

Impact Description: Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. As per Section 11.2.4.3 of Chapter 11: Water, direct impacts are identified to channel morphology and geomorphology (bed and banks of watercourses) due to instream works. The potential for indirect effects which would lead to sediment deposition at a scale to alter channel morphology or the flow regime are considered unlikely; with reference to Project Design measures.

Aquatic species are likely to be present in fishery value watercourses at instream construction works locations at W1 and W3 (new crossing locations at Mountphilips Substation site) and at W14 along the 110kV UGC on the Regional Road (potential culvert replacement works). Any change in watercourse morphology which affects channel flow regimes can result in cross factor effects on aquatic ecological communities. Aquatic species are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration and the avoidance of barriers to passage; and avoidance of channel constriction during low flow.

Instream works are limited to the individual crossing points (W1 and W3) and include trenching works for underground cables, installation of temporary (W1) or permanent (W3) crossing structures and reinstatement works. Works for the UWF Grid Connection also involve the replacement of some existing culverts under public road pavements, with 1 no. culvert (W14) potentially requiring replacement at a watercourse with fisheries value. The creation of adverse flow conditions or habitat limitations due to changes to flow or morphology will be limited to the specific works period within or adjacent to the aquatic habitat.
As per project design, instream construction works at the watercourse crossings W1, W2 (no fisheries value) 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.

As per project design, culvert replacement works at W14 and the 12 no. other watercourse crossings (no fisheries value) will be subject to reinstatement works which will include site-specific 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. These measures 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.
Project Design Measures also include the use of culverts at all new permanent watercourse crossings which will be a minimum of 900mm in diameter and will be bottomless or clear spanning at W1, W2, W3 and W14 watercourse crossings. In addition, in-stream works will only be undertaken during dry weather within the IFI instream works window (July – September inclusive), and will include for the equilibrated reinstatement of flow and the use of diffuser plates where required.
Impact Quality: Negative

Evaluation the Subject Development Impact – Changes to Flow Regime
Element 1: UWF Grid Connection – direct/indirect impact
Impact Magnitude: Works at, or in close proximity to, watercourses have potential to indirectly affect aquatic species and habitats through changes to flow regimes which can be caused directly by morphological changes due to instream works. 16 No. of the 68 No. watercourses within the UWF Grid Connection site are evaluated as having fisheries value (i.e. Class 1 or Class 2). At Mountphilips Substation 3 no. watercourse crossings are proposed, two of these watercourses (W1 and W3) have fisheries value (both Class 2). Instream works at these two watercourses will involve the installation of one temporary crossing structure (W1) and one permanent crossing structure (W3). The 65 No. watercourse crossings along the UWF Grid Connection 110kV UGC, outside of the Mountphilips Substation site, all exist along the public road network and along the private paved road near the Consented UWF Substation. 14 No. of the 65 No. watercourses have been evaluated to have fisheries value. Of these 14 No. watercourses, 1 No. will be subject to *potential* culvert replacement works (W14). At W14, changes to the flow regime will be brief (1 day) and for the duration of the immediate works, restricted to the location of the works area within the footprint of, or directly adjacent to the existing crossing point in the public road. Changes to the flow regime at these crossing locations will be avoided through the isolation of flow, over pumping of the water from upstream to downstream of works, the use of deflector plates, the equilibrated restoration of flow and the sensitive restoration of the bed and banks of these watercourse following works (Project Design). The magnitude of impact is negligible to low, taking account of Project Design. The remaining 13 No. watercourses with fisheries value, including all required crossings of major rivers Newport, Clare and Bilboa Rivers, are all across existing crossing structures which do not require any instream works or culvert replacement works and cables will be installed either under or over the structure. Any changes to flow regime due to sedimentation will be of negligible magnitude with the implementation of Project Design Measures, such as the use of sandbags to avoid the runoff of sediment laden water from construction works areas, and the treatment of any water pumped from excavations prior to discharge.
Significance of the Impact: Slight
Rationale for Impact Evaluation: • Instream works at W1 and W3, and culvert replacement works at W14 will only be undertaken during dry weather within the IFI specified period (July – September) watercourses with fisheries value, this will also be applied to W2 and the 12 no. watercourses with sub-optimal or no fisheries value, to protect downstream watercourses (Project Design Measure); • The Class 1 and Class 2 watercourses at W1, W3 and W14 are characterized as small, first order streams, which have all been in some way altered by the existing landuse (i.e. agriculture or public road infrastructure); • The limited extent of direct instream works potentially affecting flow, and the sensitive design of new/re-placed crossing structures following from pre-planning consultation with IFI. • The brief to temporary duration and reversibility of any effects. • the implementation of comprehensive water quality Project Design protection measures which will mini-mize/avoid sediment laden runoff from entering watercourses;
Element 1: UWF Grid Connection – cumulative impact
The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2). The potential for cumulative effects with the Other Elements of the Whole UWF Project relates to those watercourses with fisheries value which will be subject to instream works for both UWF Grid Connection and for Other Elements. Neither Upperchurch Windfarm nor UWF Replacement Forestry nor UWF Other Activities will require any instream works, and UWF Grid Connection will not require any instream works/culvert replacement works on watercourses with fisheries value in the catchment areas of these Other Elements, therefore there is no potential

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for effects via instream works. In relation to effects via sedimentation, as per Chapter 11 Water it has been evaluated that any sedimentation cause by UWF Replacement Forestry and UWF Other Activities will be negligible and consequently these project elements are not likely to contribute to any changes to flow regimes. In relation to Upperchurch Windfarm, due to the limited extent of Upperchurch Windfarm works in proximity to UWF Grid Connection works, the predominance of land drains (with no fisheries value) in the windfarm site and due to the implementation of the Sediment & Erosion Control Plan for the windfarm, it is evaluated that any cumulative impacts to flow regime (due to sedimentation) will be negligible.

UWF Related Works has limited extent and will not require instream works in the Bilboa_SC_010 sub-catchment, and is not located in either the Newport_SC_010 or Killeengarrif_SC_010 sub-catchments, therefore cumulative impacts are not likely to occur in these sub-catchments. The potential for cumulative effects with UWF Related Works is limited to the Suir_SC_030 sub-catchment, where construction works for both UWF Grid Connection and UWF Related Works will take place within the Clodiagh (Tipperary)_010 local surface water body. The UWF Grid Connection will not require any culvert replacement works on watercourses with fisheries value in the Suir_SC_030 sub-catchment, while UWF Related Works will involve instream works on five watercourses (with fisheries value) within the local surface water body. One watercourse (an unnamed tributary of the Clodiagh Upper) will be subject to instream works for UWF Related Works at WW22, c.20m upstream of the trenching works over an existing public road culvert (W65) for the 110kV UGC; however, there is no spatial or temporal overlap between these works. Furthermore, in the absence of instream works for the trench works for the proposed 110kV UGC works at W65 will not give rise to an alteration to the flow regime at this crossing point.

The spatial extent of any cumulative flow regime effects will occur within the footprint of the instream works or culvert replacement works, extending to immediately downstream where hydrological flow character may be altered locally due to bank or river bed modification or hydrological modification works; however, there is no cumulative overlap in physical or spatial extent with regard to the UWF Grid Connection with the UWF Related Works in this respect, and therefore cumulative changes to flow regime due to instream works are not expected. The cumulative magnitude is evaluated as Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The absence of instream works associated with both UWF Grid Connection and UWF Related Works in the same sub-catchment;
- The absence of instream works associated with Upperchurch Windfarm, UWF Replacement Forestry or UWF Other Activities;
- The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);
- The limited extent of direct instream works potentially affecting flow;
- The sensitive crossing designs to be implemented (Project Design);
- The brief to temporary duration and reversibility of any effects.

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

Element 2: UWF Related Works

Biodiversity

Topic

Impact Magnitude:

Works at, or in close proximity to, watercourses have potential to cause changes to flow regime through instream works and indirectly through sediment laden runoff into the watercourse.

There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works. 31 no. of the total 32 no. crossings are located within the Suir_SC_030 sub-catchment and 1 no. in the Bilboa_SC_010 sub-catchment. Of these 31 no. crossings the Suir_SC_030 sub-catchment, in-stream works will be required at 25 no. of these locations - 5 No. of which were evaluated as having fisheries value. The 1 no. watercourse crossing in the Bilboa_SC_010 will not require any instream works.

The spatial extent of changes to flow regime effects will occur within the footprint of the instream works and also immediately downstream where hydrological flow character is altered due to bank or river bed modification.

The potential for indirect effects which would lead to sediment deposition at a scale to alter channel morphology or the flow regime are considered unlikely. Instream works in watercourses with fisheries value (5 No.) relate to 3 temporary crossings for Internal Windfarm Cabling trenching works and/or the installation of a temporary crossing structure, while the remaining 2 No. relate to the installation of permanent crossing structures. The spatial extent of any flow regime effects will occur within the footprint of the instream works, and also immediately downstream where hydrological flow character is altered due to bank or river bed modification. The magnitude of impact is negligible to slight.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

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

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

Element 4: Upperchurch Windfarm

Impact Magnitude:

Construction works will take place in close proximity to 1 No. watercourses with fisheries value. No instream works are required at this location and this watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works and preclude direct modification to the flow regime.
Changes to flow regime due to sedimentation from nearby construction works will be avoided by the implementation of the Sediment & Erosion Control Plan for the Upperchurch Windfarm during construction works.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

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

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

Evaluation of Other Cumulative Impacts – Changes to Flow Regime

Whole UWF Project Effect

Cumulative Impact Magnitude:

A potential decrease in aquatic habitat via changes to flow regime is identified at **8 No**. watercourse crossings where instream works or culvert replacement works are required within watercourses evaluated as having fisheries value – 3 no. for UWF Grid Connection and 5 no. for UWF Related Works.
The potential for indirect effects which would lead to sediment deposition at a scale to alter channel morphology or the flow regime are considered unlikely.
The spatial extent of such effects will occur within the footprint of the instream works, extending to immediately downstream where hydrological flow character may be altered due to bank or river bed modification, recognising that cumulative effects are widely dispersed between two regional catchments and within several sub-catchments.

Significance of the Cumulative Impact: Slight

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Sensitive Aspect

Rationale for Cumulative Impact Evaluation:

- Instream works potentially affecting the flow regime are required at a limited number of locations; half of which require temporary works and half require permanent instream structures.
- Implementation of Project Design Measures at all stream/culvert crossings, instream works and culvert replacement works locations to minimize effects
- Implementation of the sensitive crossing designs developed following consultation with IFI.
- the use of deflector plates, the equilibrated restoration of flow
- Provision of reinstatement works at new permanent crossings/replaced existing culverts under supervision of a member of CIEEM and the Institute of Fisheries Management. .

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

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8.4.4.3 Impact Evaluation Table: Disturbance or Displacement of Fish and Aquatic Species

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: instream works; culvert replacement works; operating machinery; excavation works; noise and human disturbance; drilling works; reinstatement works

Cumulative Impact Source: Instream works, operating machinery; excavation works; noise and human disturbance; reinstatement

Impact Pathway: direct contact; ground and air vibrations

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

Impact Quality: Negative

Evaluation the Subject Development Impact – Disturbance or Displacement of Fish and Aquatic Species

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

Of the 68 No. watercourse crossings required for the UWF Grid Connection, 16 No. have been evaluated to have fisheries value.

Of these 16 No. watercourses, 2 No. watercourses at Mountphilips (W1, W3) will be subject of instream works and 1 No. watercourse along the 110kV UGC (W14) will be subject to culvert replacement works. Due to the location of works in the watercourse, the magnitude of disturbance effects at these locations is evaluated as Slight to Moderate in the local context.

The remaining 13. No watercourses with fisheries value will not require either instream works or culvert replacement works. This includes the crossing of the Newport River at W7, the crossing of the Clare River at W36 and the crossing of the Bilboa River at W53 – where the 110kV UGC will be installed within the existing bridge structures. The installation of the 110kV UGC at the other watercourses with fisheries value (W5, W8, W9, W18, W33, W38, W39, W45, W49,W65) will not involve instream works or culvert replacement works as the cables will be installed either under or over the existing structures, therefore the magnitude of disturbance effects at these locations only relates to works in the public road pavements and is evaluated as Imperceptible to Slight. There may be occasional, very short duration disturbance to fish populations utilising habitat beneath the bridge; however, this will not result in displacement, loss of territory, or holding habitat.

Disturbance may also occur at drilling locations (W8, W9) with the magnitude of disturbance impacts due to noise or vibration evaluated as Low. Similarly, due to the very short duration and nature of drilling works, these works will not result in displacement, loss of territory, or holding habitat. It should be noted that the drilling works at W8 and W9 are not within the Lower River Shannon SAC boundary.

Proposed works including trench excavation, bridge works, culvert replacement, directional drilling, and resurfacing may give rise to disturbance to fish and aquatic biodiversity receptors present within Class 1 and

Aquatic Habitats & Species

Sensitive Aspect

Class 2 watercourses over a period of c.1 – 2 days at each crossing location (and c. 2 to 5 days at drilling locations). The frequency of these disturbance effects is once only for cables trenches with or without new permanent culverts.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design);
- The Class 1 and Class 2 watercourses W1, W3 and W14, where in-stream works are required, are small first order streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing. All fish and Annex II listed species (White-clawed crayfish) will be translocated to suitable habitat in immediate proximity downstream, within the same watercourse. This will be completed under license and following standard protocols; (Project Design);
- The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of instream works at W1 and W3 and any potential culvert replacement works at W14.
- The frequency of disturbance effects will be once for works at W1, W3 and W14,
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2).

The potential for cumulative effects with the Other Elements of the Whole UWF Project relates to those watercourses with fisheries value which will be subject to instream works or works in close proximity for both UWF Grid Connection and for Other Elements.

Neither UWF Replacement Forestry nor UWF Other Activities will require any instream works, and works in close proximity will be small in scale; it is therefore evaluated that the magnitude of any cumulative disturbance impacts will be negligible. Neither Upperchurch Windfarm nor UWF Related Works require instream works in the Bilboa_SC_010 sub-catchment, and neither are located in the Newport_SC_010 or Killeengarrif_SC_010 sub-catchments. The potential for cumulative disturbance effects is limited to the Suir_SC_030 sub-catchment, where both Upperchurch Windfarm and UWF Related Works will occur and will require instream works or works in close proximity to watercourses with fisheries value.

UWF Related Works will involve instream works on five watercourses (with fisheries value) in the Suir_SC_030 sub-catchment, and Upperchurch Windfarm will involve works in close proximity (but no instream works) to one of these five watercourses (WW2) (during the construction of a clear span structure over this watercourse). The potential for UWF Grid Connection to cause disturbance/displacement effects in the Suir_SC_030 is limited to 1 No. watercourse (W65) with fisheries value, where works will only involve trenching works in the public road over an existing culvert, and no instream or culvert replacement works will be required at this location, neither will there be any temporal overlap between works at the UWF Grid Connection crossing locations and UWF Related Works instream works (Project Design), and furthermore UWF Grid Connection is not located close to WW2. This minimises the potential for cumulative disturbance or displacement effects caused by UWF Grid Connection. Therefore the magnitude of any cumulative effects will be Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The UWF Grid Connection will not require any culvert replacement works for watercourses of fisheries value in the Suir_SC_030 sub-catchment, and therefore any disturbance/displacement effects to fish in the Suir

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catchment only relates to brief disturbance as a result of trenching works in the public road over 1 No. existing culvert;

- In-stream works or culvert replacement works for UWF Grid Connection will only be undertaken during dry weather within the IFI specified period (July – September) (Project Design Measure);
- In-stream works for UWF Related Works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The in-stream works for either UWF Grid Connection or UWF Related Works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure). All fish and Annex II listed species (White-clawed crayfish) will be translocated to suitable habitat in immediate proximity downstream, within the same watercourse. This will be completed under license and following standard protocols;
- The frequency of disturbance effects will be once;

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

Element 2: UWF Related Works

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

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- All fish will be translocated to suitable habitat in immediate proximity downstream, within the same watercourse prior to works (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
- The singular frequency of any disturbance events at half of the locations, and;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

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

Element 4: Upperchurch Windfarm

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species; however, it was identified that significant impacts were not probable/not likely post-mitigation. A clear-span bridge will be used at WW2 and therefore no in-stream works are required; disturbance will be limited to the immediate works area.

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

Evaluation of Other Cumulative Impacts – Disturbance or Displacement of Fish and Aquatic Species

Whole UWF Project Effect

Cumulative Impact Magnitude:

Direct disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works or culvert replacement works and directly upstream and downstream of all crossings, temporary and permanent instream works structures, bank-side works and construction works adjacent to watercourses and over existing crossing structures. The watercourse crossings are dispersed between two regional catchments and within several local sub-catchments. In total there are **8 No.** instream works locations where instream works/culvert replacement works in fish-bearing streams are required – 3 no. for UWF Grid Connection and 5 no. for UWF Related Works, all of which will be sensitive to disturbance. However, at the local level in the context of individual receptors, temporary displacement will be limited to the affected stretch of watercourse, without cumulative population-level impacts at a watercourse or catchment level. Disturbance may also occur at 14 No. other watercourse crossing points due to works in close proximity – 13 no. for UWF Grid Connection and 1 no. for UWF Related Works/Upperchurch Windfarm.

Significance of the Cumulative Impact: Slight

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse, and the trans-location of fish, prior to the in-stream works commencing (Project Design Measure);
- The linear nature of the UWF Grid Connection 110kV UGC works over a large c.23km latitudinal distance;
- The low number of watercourses (8 No. in total) with fisheries value and subject to instream/culvert replacement works.
- The frequency of disturbance effects will be once for all 110kV UGC cables trenches at crossing locations with or without potential culvert replacement;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

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

8.4.4.4 Impact Evaluation Table: Riparian habitat degradation

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: instream works, culvert replacement works; movement of soils and machinery; excavation works; reinstatement works

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

Impact Pathway: Soils; Direct contact

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

The removal of, or damage to, riparian vegetation during instream works or excavation/ground clearance works in close proximity to any watercourse has the potential to impact on the quality of riparian habitats which in turn can affect watercourse morphology, shading, bank stability, and nutrient and sediment loading and result in indirect effects on aquatic species.

Impact Quality: Negative

Evaluation the Subject Development Impact – Riparian habitat degradation

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

Of the 68 No. watercourse crossings required for the UWF Grid Connection, 16 No. have been evaluated to have fisheries value. Of these 16 No. watercourses, **2 No**. watercourses at Mountphilips (W1, W3) will be subject of instream works. Riparian habitat at the W1 and W3 crossing locations consists of vegetation clearance (as necessary: topsoil stripping, scrub removal) within the boundary of the temporary construction works area at the Mountphilips Substation site. As per Project Design, following works at W1 and W3, reinstatement works will be carried out which will include site-specific bank stabilisation measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels within the bank-width of the existing river corridor, where necessary and replanting of riparian buffer zones with suitable native species to manage flood flows and buffer run-off. The duration of any loss of well-structured riparian habitat impacts is evaluated with regard to the direct aquatic habitat services provided by the riparian zone (bank stabilization and erosion control, shading and temperature regulation), as well as the indirect inputs such as habitat for invertebrate food for fish and aquatic biota, reduction in light for aquatic flora, flood control and buffering effects in relation to run-off. The context of riparian habitat quality in the study area is considered, with regard to existing intensive agriculture affecting baseline conditions at the W1 and W3 crossing points; which has resulted in degraded cover due to bank side clearance works at the majority of crossing locations. Riparian habitat impacts will be reversible with reinstatement and will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established. The impact magnitude is Low.

Culvert replacement works will be required at potential up to 13 no. existing watercourse crossings along the public road. Only **1 no**. of these watercourse has fisheries value (W14), while 3 No. have sub-optimal fisheries value (Class 3), and at 9 no. have no fisheries value (Class 4). The replacement of the existing culvert is expected to have minimal effect on any adjacent riparian habitat degradation due to the works taking place from the road pavement above, and from either side of, the culvert, with works in the watercourse limited to the placement of sandbags and deflector plates, placement of the culvert and reinstatement works. Any reinstatement of the immediately adjacent culvert finishing works, will be of a negligible magnitude and are considered unlikely to result in any impact on adjacent riparian habitat.

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Sensitive Aspect

At the remaining 13 No. watercourse crossings along the 110kV UGC route (which have fisheries value), including all required crossings of major rivers (Newport, Clare and Bilboa), the installation of the 110kV UGC will utilise existing crossing structures which do not require any instream works or culvert replacement works and the 110kV UGC will be installed within the existing bridge structures; or under or over the existing culverts, therefore there is no potential to damage or remove riparian habitat either side of the road corridor at these locations.

At the remaining 39 watercourse crossings locations (all of which are along the 110kV UGC route on public roads), are at existing watercourse crossing locations which have low/none fisheries value, and the impact magnitude of riparian habitat degradation on aquatic ecological receptors is evaluated as negligible.

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to 3 watercourse crossing locations within minor watercourses (W1, W3 and W14);
- The general context of the three watercourses with fisheries value affected (W1, W2, W14) comprises first order streams within managed agricultural lands within enclosed or fully tunneled riparian vegetation at the crossing points. ;
- Bank works will be required at watercourse crossing locations W1, W3, with minor clearance of riparian vegetation within the footprint of the potential culvert replacement at W14;
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions and reversible with reinstatement.
- supervision of all instream works (i.e. W1, W2 (no fisheries value) and W3) and culvert replacement works (W14 and 12 no. other locations at watercourses with sub-optimal or no fisheries value) by a member of CIEEM and the Institute of Fisheries Management

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:
The potential for cumulative impacts relates to waterbodies within which instream works or culvert replacement work for UWF Grid Connection are expected to cause degradation of riparian habitat. For UWF Grid Connection, this only relates to W1, W3 and W14. No Other Element is located in close proximity to these watercourse crossings; therefore it is considered that there is no potential for cumulative impacts.

Significance of the Impact: No Cumulative Impact

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations, with no overlap between UWF Grid Connection and the Other Elements, as instream works will take place in separate catchments.

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

Element 2: UWF Related Works

Impact Magnitude: Riparian habitat will be affected at **6 No**. watercourse crossings identified as having fisheries value, out of a total of 32 watercourse crossings within the construction works area boundary associated with the UWF Related Works. The duration of any loss of well-structured riparian habitat impacts will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established.

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

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

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

Element 4: Upperchurch Windfarm

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

Significance of the Impact: Imperceptible

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

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

Evaluation of Other Cumulative Impacts – Riparian habitat degradation

Whole UWF Project Effect

Cumulative Impact Magnitude:
Riparian habitat will be affected at **9 No**. watercourses with fisheries value which will be associated with bankside works, instream works or culvert replacement works –3 no. for UWF Grid Connection and 6 no. for UWF Related Works (includes 1 no. for Upperchurch Windfarm. The cumulative impact magnitude of the whole project on the riparian and bankside habitats within the Shannon and Suir regional catchments is evaluated as Negligible to Low.

Significance of the Cumulative Impact: Slight to Moderate

Rationale for Cumulative Impact Evaluation:
- The instream works at W1 and W3, and culvert replacement works at W14 required for the 110kV UGC are all located within the River Shannon catchment, while the watercourse crossings required for the Upperchurch Windfarm and UWF Related Works are all located in the River Suir surface water catchment;
- The limited extent of instream works, within defined works areas will reduce the potential spatial area.
- The Class 1 and Class 2 watercourses where in-stream works are required are small, first order streams and therefore are likely to have relatively low flows during July to September which will enable easier access;
- Existing riparian habitat quality within the works areas, which comprise the baseline for evaluation of impact significance, is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at stream crossing locations, limited to the direct footprint of the temporary works areas; alternatives to temporary riparian clearance are not available.

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Sensitive Aspect

• The duration of the impact are generally once-off, restricted to the period of works within or adjacent to the aquatic habitat; relate to individual watercourses and are thus not subject to sequential project effects. • Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible.

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

Topic **Biodiversity**

8.4.4.5 Impact Evaluation Table: Spread of Invasive Aquatic Species

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: instream works; culvert replacement works; excavation works, movement of soils and machinery
Cumulative Impact Source: Instream works; Excavation works, movement of soils and machinery
Impact Pathway: Surface water; Movement of soils and machinery

Impact Description: Invasive aquatic species include non-native, terrestrial invasive species such as Japanese knotweed or Himalayan balsam, invasive riparian vegetation (such as Japanese knotweed) and also fish and mobile invertebrate fauna (such as Asian clam, Signal crayfish, or non-native shrimp species).

Aquatic invasive species may be introduced to unaffected catchments or spread within infected watercourses during the course of instream works or transported via excavated material by site machinery.

Aquatic invasive species have the potential for significant ecosystem disturbance, disrupting the predator/prey balance or causing habitat disruption within aquatic systems. The spread of aquatic invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream (mobile species and 3rd party transport) and downstream (hydrological transport) within a watercourse, potentially extending throughout the catchment.

Non-native, invasive species potentially affecting the aquatic environment can also include terrestrial species which compromise bank integrity, riparian structural diversity and riparian invertebrate production contributing to habitat diversity and feeding inputs within the aquatic system. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication. In this respect, spread of aquatic invasive species is evaluated as non-reversible; however the management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plan which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided, and therefore it is considered that this impact is unlikely to occur.

Impact Quality: Negative

Evaluation the Subject Development Impact – Spread of Aquatic Invasive Species

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
There is the potential for introduction of non-native, invasive species at all 68 No. watercourse crossing points associated with the Mountphilips Substation site and 110kV UGC works due to the carrying out of works at or in close proximity to watercourses, and due to the movement of machinery over watercourses at existing road crossings; these include the transport, spread or introduction of terrestrial invasive species such as Japanese knotweed or Himalayan balsam, where these species occur widely within the study area. The potential for introduction of aquatic invasive species including mobile invertebrate fauna (such as Asian clam, Signal crayfish, or non-native shrimp species) or invasive riparian vegetation (such as Japanese knotweed), is limited to the instream works areas at W1, W2 and W3 at the Mountphilips Substation site, and at the 13 No. culvert replacement locations along the route of the 110kV UGC, where works may interact with the aquatic environment to facilitate introduction or spread of aquatic species.
However the management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plan for UWF Grid Connection which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided, and therefore it is considered that this impact is unlikely to occur.

Significance of the Impact: No Likely Impact

Aquatic Habitats & Species

Sensitive Aspect

Rationale for Impact Evaluation:

- the implementation of the Invasive Species Management Plan and adherence to best practice Biosecurity Protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: As evaluated above, there is potential for the spread of invasive species either along the riparian corridor, or within the aquatic environment, at the 68 No. watercourse crossing points associated with UWF Grid Connection due to the carrying out of works at or in close proximity to watercourses, and due to the movement of machinery over watercourses along the road verge, where existing infestations of negative species occur (e.g. Japanese knotweed, Himalayan balsam, etc.). The risk of the spread of invasive species is increased where additional works due to the Other Elements take place within a local catchment area, where these works (or traffic associated with these works) will occur within or in close proximity to watercourses. UWF Grid Connection works will occur in the same catchment as the UWF Related Works and the consented Upperchurch Windfarm in the Bilboa_SC_010 and the Suir_SC_030 sub-catchments. The Suir_SC_030 sub-catchment also has potential to be affected by works for UWF Replacement Forestry.

In the Bilboa_SC_010, works for UWF Grid Connection will take place at or in close proximity (20m) to 24 No. watercourses, with works at 1 No. watercourse within the Bilboa_SC_010 also required for UWF Related Works. No works in close proximity to watercourses are required for Upperchurch Windfarm. The cumulative impact magnitude for the Bilboa_SC_010 sub-catchment is evaluated as Medium.

In the Suir_SC_030 sub-catchment, works for UWF Grid Connection will take place at or in close proximity (20m) to 5 No. watercourses, with works at 26 No. watercourse within the sub-catchment also required for UWF Related Works and works close to 1 No. watercourse required for Upperchurch Windfarm. The cumulative impact magnitude for the Bilboa River catchment is evaluated as Low.

In relation to Other Projects: it is expected that Best Practice biosecurity measures will be implemented for the potential Bunkimalta Windfarm (and consented grid connection) to prevent the spread of invasive species by those developments to ensure compliance with legislative requirements. While the consented Castlewaller Windfarm includes the implementation of Best Practice including a monitoring and evaluation Programme in respect of Japanese Knotweed to be implemented as part of its EMP, cumulative impact magnitude is evaluated as Low in the Killeengarrif_SC_010 and Newport_SC_010 sub-catchments.

However the management of non-native, invasive species at UWF Grid Connection works locations will be subject to a bespoke Invasive Species Management Plan for UWF Grid Connection which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species (by UWF Grid Connection) is avoided, and therefore it is considered that this cumulative impact is unlikely to occur.

Significance of the Impact: No Likely Cumulative Impact

Rationale for Impact Evaluation:

- the implementation of the Invasive Species Management Plan for UWF Grid Connection and adherence to best practice Biosecurity Protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring.
- In addition, the construction of the other projects under consideration, will be obliged to meet its statutory requirements with regard to the introduction or spread of invasive species as set out in the European Communities (Birds and Natural Habitats) Regulations 2011, with specific reference to species listed in Annex III of those regulations.

Topic **Biodiversity**

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at all 32 No. watercourse crossings associated with the UWF Related Works. However the management of non-native, invasive species at UWF Related works locations will be subject to a bespoke Invasive Species Management Plan for UWF Related Works which includes Best Practice biosecurity measures and supervison, this will ensure that the spread of invasive species is avoided, and therefore it is considered that this cumulative impact is unlikely to occur.
Significance of the Impact: No Likely Impact
Rationale for Impact Evaluation: • The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication. • In this respect, the spread of aquatic invasive species is evaluated as non-reversible, however • the implementation of the Invasive Species Management Plan, including best practice biosecurity protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.4.2.2.1*
Element 4: Upperchurch Windfarm
Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at the 1 No. watercourse crossing associated with the Upperchurch Windfarm works. However the management of non-native, invasive species at Upperchruch Windfarm locations will be subject to Best Practice biosecurity measures and invasive species control, along with supervison by an invasive species specialist, as provided in the UWF Grid Connection Invasive Species Management Plan, this will ensure that the spread of invasive species is avoided, and therefore it is considered that this impact is unlikely to occur.
Significance of the Impact: No Likely Impact
Rationale for Impact Evaluation: • Best practice biosecurity and invasive species control measures will be implemented during construction works to prevent the spread of invasive species, which will meet regulatory requirements.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.4.2.2.1*
Cumulative Information: Individual Evaluations of Other Projects or Activities
Other Projects: Newport Town Park, Castlewaller Windfarm, Bunkimalta Windfarm
Impact Magnitude: The potential for development works for Newport Town Park to spread invasive species is limited due to the absence of instream works or works within 5m of the river. In addition this project includes measures for control and management of non-native invasive species and thus will not interact cumulatively with the UWF Grid Connection proposal. In relation to Castlewaller Windfarm, Japanese Knotweed and Rhododendron (terrestrial invasive species) were identified in studies to inform the original application. In the Ecological Management Plan submitted to the competent authority as part of the RFI response, and adherence to the eradication of Knotweed and Best Practice stipulated by Invasive Species Ireland is described, as part of measures to be taken prior to construction, during the construction stage and during the operation and maintenance stage. It is assumed that the grid

connection element (which may be proposed at a future date), will include best practice control measures to prevent the spread of invasive species, to meet regulatory requirements.
In relation to Bunkimalta Windfarm, no Aquatic invasive species were described. In relation to Bunkimalta, no Invasive species were identified in baseline studies to inform the 2013 EIS, however it is assumed that any future planning application for this windfarm will include uptodate information on the occurance of invasive species and will incorporate Best Practice control measures to avoid their spread.

Significance of the Impact: Not Significant (residual)

Rationale for Impact Evaluation:

- The implementation of invasive species control measures as consented (Newport Town Park, Castlewaller Windfarm)
- it is assumed that the Castlewaller grid connection and Bunkimalta Windfarm (both/either of which may be proposed at a future date), will include best practice control measures to prevent the spread of invasive species, to meet regulatory requirements.
- The construction of both Castlewaller and Bunkimalta windfarms and their associated elements, will be obliged to meet the requirements set out in the Ecological Management Plan, in addition to its statutory requirements with regard to the introduction or spread of invasive species as set out in the birds and habitats regulations- with specific reference to species listed in Annex III of those regulations.

Evaluation of Other Cumulative Impacts – Spread of Aquatic Invasive Species

Whole UWF Project Effect

Cumulative Impact Magnitude:
There is the potential for introduction of non-native, invasive aquatic species at **100 No**. watercourse crossing works locations, spread over 2 regional catchments, associated with the Whole UWF Project – 68 no. for UWF Grid Connection and 32 no. for UWF Related Works (includes 1 no. for Upperchurch Windfarm). The impact magnitude is evaluated as Medium due to the presence of invasive species throughout the study area, established as the baseline condition and thus contributing to the risk of spread where infestations from one location to another.
However the management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plans for both UWF Grid Connection (which includes for Upperchurch Windfarm) and UWF Related Works which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided, and therefore it is considered that this impact is unlikely to occur.

Significance of the Cumulative Impact: No Likely Impact

Rationale for Cumulative Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species are evaluated as non-reversible, however
- The implementation of the Invasive Species Management Plan for UWF Grid Connection and UWF Related Works, including best practice Biosecurity Protocols (IFI, 2010), and the implementation of best practice measures for Upperchurch Windfarm will ensure that there is no likelihood of this effect occurring.

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

Cumulative Impact Magnitude:
There is the potential for introduction of non-native, invasive aquatic species at 100 No. watercourse crossing works locations, spread over 2 hydrometric areas, associated with the Whole UWF Project. The impact magnitude is evaluated as Medium due to the presence of invasive species throughout the study area,

established as the baseline condition and thus contributing to the risk of spread where infestations from one location to another.
With regard to Other Projects, it is considered that while both projects have potential to spread invasive species, that it is not likely to occur due to the expected implementation and adherence to Best Practice in the eradication and treatment of invasive species to ensure compliance with legislative requirements .

Significance of the Cumulative Impact: No Likely Impact

Rationale for Cumulative Impact Evaluation:

- The implementation of the Invasive Species Management Plan for UWF Grid Connection and Upperchurch Windfarm, and UWF Related Works, including best practice biosecurity protocols (IFI, 2010), and supervison by an invasive species specialist, will ensure that there is no likelihood of this effect occurring.
- In addition, the construction of the other projects under consideration, will be obliged to meet its statutory requirements with regard to the introduction or spread of invasive species as set out in the European Communities (Birds and Natural Habitats) Regulations 2011, with specific reference to species listed in Annex III of those regulations.

8.4.4.6 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-36 below.

Table 8-36: Description and Rationale for Excluded Impacts to Aquatic Habitats & Species

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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Storage of Brash, tree felling, hedgerow trimming, vegetation clearance	2,4,5	Nitrogen Deposition	Aquatic Habitat Degradation (as a result of increased nutrification/nitrogen deposition) such as temporary oxygen shortages.	Rationale for Excluding: No potential for impact/Neutral Impact No felling for UWF Grid Connection, or UWF Replacement Forestry. In relation to UWF Related Works and the Consented Upperchurch Windfarm, the scale of forestry felling is insufficient to result in additive nitrogen deposition effects – any effects will be Neutral.
Operational Stage				
Rationale for Excluding: Access routes and permanent watercourse crossing structures will be in place. Operational Works will be minimal, with no works to watercourse crossing structures expected.				
Decommissioning Stage				
Rationale for Excluding: UWF Related Works, Upperchurch Windfarm: Access routes and permanent watercourse crossing structures will be in place. Works will be subject to best practice management measures. UWF Grid Connection will not be decommissioned.				

8.4.5 Mitigation Measures for Impacts to Aquatic Habitats & Species

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

8.4.6 Evaluation of Residual Impacts to Aquatic Habitats & Species

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

8.4.7 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.

8.4.7.1 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 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.

8.4.7.2 Invasive Species Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Invasive Species Management Plan developed to prevent/avoid the introduction and/or spread of invasive species. The Invasive Species Management Plan includes Best Practice biosecurity measures and describes supervision by an Invasive Species Specialist during the construction phase.

8.4.7.3 Application of Best Practice for Aquatic Habitats & Species

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	Best Practice Measures for Protection of Surface Water Quality and Watercourse Morphology during instream works at Mountphilips Substation site
GC-BPM-02	Best Practice 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	Best Practice Design of New Permanent Watercourse Crossing Structures and Existing Culvert Replacements to Prevent Flood Risk
GC-BPM-04	Best Practice Surface Water Quality Protection Measures For Site Runoff During The Mountphilips Substation Site Construction Works
GC-BPM-05	Best Practice Measures to Protect Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-06	Best Practice Measures To Protect Surface Water And Groundwater Quality During Storage And Handling Of Fuels, Oils And Chemicals
GC-BPM-07	Best Practice Measures to Protect Surface Water Quality During Storage of Overburden at the Mountphilips Substation Site

8.4.8 Summary of Impacts to Aquatic Habitats & Species

A summary of the Impact to Aquatic Habitats & Species is presented in Table 8-37.

Table 8-37: Summary of the impacts to Aquatic Habitats & Species

Impact to Aquatic Habitats & Species	**Decrease in instream aquatic habitat quality**	**Changes to flow regime**	**Disturbance or displacement**	**Riparian habitat degradation**	**Spread of aquatic invasive species**
Evaluation Impact Table	*Section 8.4.4.1*	*Section 8.4.4.2*	*Section 8.4.4.3*	*Section 8.4.4.4*	*Section 8.4.4.5*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction
UWF Grid Connection *Direct/indirect impact*	**Slight to Moderate at new or replacement culverts (3 No. locations)** **Slight at Sub-Catchment level**	**Slight**	**Slight**	**Slight to Moderate**	**No Likely Impact**
UWF Grid Connection *Cumulative impacts*	**Imperceptible to Moderate in the local context**	**Imperceptible**	**Imperceptible**	**No Cumulative Impact**	**No Likely Cumulative Impact**
Element 2: UWF Related Works	Imperceptible to Moderate	Slight	Slight to Moderate	Slight to Moderate	No Likely Impact
Element 3: UWF Replacement Forestry	No Potential for Impacts - Evaluated as Excluded, see Section 8.4.2.2.1				
Element 4: Upperchurch Windfarm	Imperceptible	Slight	Imperceptible	Imperceptible	No Likely Impact
Element 5: UWF Other Activities	No Potential for Impacts - Evaluated as Excluded, see Section 8.4.2.2.1				
Cumulative Impacts:					
All Elements of the Whole UWF Project	Imperceptible to Moderate in the local context	Slight	Slight	Slight to Moderate	No Likely Impact
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Newport Town Park Castlewaller Windfarm Bunkimalta Windfarm	Slight	N/A - evaluated as excluded, See Section 8.4.2.2.1			No Likely Impact

Aquatic Habitats & Species

Sensitive Aspect

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

Topic **Biodiversity**

8.5 Sensitive Aspect No.4: Terrestrial Habitats

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

Donncha O Cathain, Chris Cullen and Howard Williams were the main authors of this Section. Please see Sources of Informaiton (Section 8.1.7) and Methodology (Section 8.1.8) for details of the desktop and fieldwork surveys which have informed the evaluation of Terrestrial Habitats.

8.5.1 BASELINE CHARACTERISTICS of Terrestrial Habitats

8.5.1.1 STUDY AREA for Terrestrial Habitats

The study area for Terrestrial Habitats in relation to the UWF Grid Connection is described in Table 8-38 and illustrated on Figure GC 8.5: UWF Grid Connection Study Area for Terrestrial Habitats (Overview and Maps 1 to 4) (Volume C3 EIAR Figures).

Table 8-38: UWF Grid Connection Study Area for Terrestrial Habitats

Study Area for Terrestrial Habitats	Justification for the Study Area Extents
Construction works area boundary plus 50m in all directions	Professional judgement and as per Best Practice (CIEEM, 2018)

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

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

Within the construction works area, the Public Road and other built surfaces (BL3) accounts for 24.2ha or 82% of the habitat.

Thirty-seven habitat types (including fifteen types of habitat mosaic) comprising 306.9Ha were recorded along the survey corridor (i.e. within 50m of the construction works areas). The dominant habitats present are buildings and artificial surfaces (BL3) (15%), agricultural grassland (GA1) (36%), wet grassland (GS4) (13%), and a mosaic of built land and amenity grassland (BL3/GA2) (10.5%) which together make up 75% of all habitats present. Conifer plantation (WD4) and Scrub (WS1) have the highest cover of the remaining habitats by area at 8.8%, and 3.5% of the total area respectively. The remaining 13.1% of habitats include mixed/broadleaf/conifer woodland (WD2) (1.9%), riparian woodland (WS5) (1.6%), amenity grassland (GA2) (1.5%) and WS1/GS4 (1%) and a mixture of 27 habitats or habitats mosaics each less than 1% of the overall total within the study area.

Habitats of Local Importance (Higher Value) include buildings and artificial surfaces (BL3) (based on possible importance of certain roadside buildings to bats/Barn Owl), scrub (WS1) (importance to local diversity), mixed broadleaf woodland (WD1) (based on importance to birds/mammals), mixed broadleaf/conifer woodland (WD2) (based on importance to birds and mammals), hedgerows (WL1) (level of maturity and value to birds and mammals), tree lines (WL2) (local importance to birds and mammals), and riparian woodland (WN5) (Importance to local diversity and hydrological function) and.

Six linear habitat types comprising Tree lines (WL2), Hedgerows (WL1), Earthen banks (BL2), Drainage ditches (FW4), Depositing/lowland rivers (FW2), and Stone walls (BL1) were also recorded. The total length of linear hedgerow and treelines (or mosaics of both) present within the study area along the survey corridor comprises 39.2km.

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

No Flora Protection Order (FPO) species are present within, or in close proximity to, construction works areas.

Non-native invasive plant species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are herein described. Rhododendron (*Rhododendron ponticum*) is present at 25 locations. Japanese knotweed or Himalayan knotweed infestations were recorded at 17 locations during habitat assessments on the UWF Grid Connection. Giant hogweed *(Heracleum mantegazzianum)* was recorded at one location. Locations of non-native invasive plant species are illustrated in Figure GC 8.5.

Cherry laurel *(Prunus laurocerasus)* was recorded at 12 locations, this species, while not listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) is listed as a 'High impact' invasive species by O' Flynn *et al.* (2014). 'Medium impact' non-native invasive plant species (Kelly *et al.,* 2013, O' Flynn *et al.*, 2014) recorded included Sycamore (*Acer pseudoplanatus*), Pheasant berry (*Leycesteria formosa*), and Cotoneaster *(Cotoneaster spp.)*. Other non-native plant species of lesser significance were also recorded, these included Box honeysuckle *(Lonicera nitida),* Snowberry *(Symphoricarpus albus),* Montbretia *(Crocosmia x crocosmiflora)* and Bamboo *(*Subfamily *Bambusoideae).*

Further details on terrestrial habitats surveys are included in Appendix 8.3: Terrestrial Habitats Survey Results & Impact Calculations in Volume C4 EIAR Appendices.

8.5.1.3 Importance of Terrestrial Habitats

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

Habitats of National Importance include: Newport River, Clare River, Bilboa River, and Upland/Eroding Streams habitats which are hydrologically connected to the Lower River Shannon SAC, comprising high and good ecological status surface water habitats, and supporting nationally important fisheries and protected fauna.

Habitats of Local Importance (Higher Value) occurring within the survey corridor for the proposed development include wet grassland (GS4), scrub (WS1), mixed broadleaf woodland (WD1), mixed broadleaf/conifer woodland (WD2), hedgerows (WL1), and tree lines (WL2). A small area of Oak-birch-holly woodland (WN1) at Scraggeen was found to correspond to the EU Habitats Directive 92/43/EEC habitat, 'Old sessile oak woods with Ilex and Blechnum, in the British Isles (91A0)', and is therefore evaluated as being of County Importance.

A small area of Wet heath/Wet grassland (HH3/GS4) habitat mosaic was found at Loughbrack Townland; wet heath corresponds to EU Habitats Directive 92/43/EEC Annex I habitat 'Northern Atlantic wet heaths with Erica tetralix (4010)', however as the area of habitat in question was very limited in extent and degraded through grazing and drainage it is considered to be of Local Importance (Higher Value). An area of Lowland blanket bog (PB3) was found at Reardnogy Beg, this habitat corresponds to EU Habitats Directive 92/43/EEC Annex I habitat to 'Blanket bogs (7150)'; however, this area of bog was found to be in poor condition due to evidence of peat harvesting and substantial colonization by invasive Rhododendron.

With the exception of 0.05ha of Wet Grassland (GS4) at Mountphilips Substation site, none of the above described habitats are located within the works area and hence will not be directly impacted by the UWF Grid Connection. It is noted that the Mountphlips Substation site is predominantly (1.7ha) Improved Agricultural Grassland (GS1), which is of Local Importance (Lower Value).

Due to the location of sections of the UWF Grid Connection 110kV UGC within an SPA designated for Hen Harrier, a number of habitats along the route of the 110kV UGC support the structure and function of the SPA. This primarily includes foraging habitats in the open landscape (grassland, heath and bog) habitats. See Sensitive Aspect Hen Harrier Section 8.6.1 for further information.

8.5.1.4 Sensitivity of Terrestrial Habitats

Terrestrial Habitats are sensitive to direct land take, pollution, and environmental changes resulting from modification such as increased drainage. Groundwater dependant habitats such as bog and peatland habitats may be sensitive to changes in groundwater regimes or changes in ground water quality. The diversity of habitats is particularly sensitive to encroachment from invasive species which may out-compete local native species. Habitats are also sensitive to Human activities such as burning and recreational use.

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

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

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

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

8.5.1.6 Receiving Environment (the Baseline + Trends)

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

8.5.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.5.2.1 Cumulative Evaluation Study Areas

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

The study is illustrated on Figure CE 8.5: UWF Grid Connection Cumulative Evaluation Study Area for Terrestrial Habitats (Maps 1 to 4).

8.5.2.1.2 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 8.5.2.2.1 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 8-39 and illustrated on Figure WP 8.5: Whole Project Study Area for Terrestrial Habitats (Overview and Maps 1 to 4) (Volume C3 EIAR Figures).

Table 8-39: Whole Project Cumulative Evaluation Study Area for Terrestrial Habitats

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Construction works area boundary/afforestation lands plus 50m in all directions	Professional judgement and as per Best Practice (CIEEM, 2018)
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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

The evaluation of cumulative impacts to Terrestrial Habitats also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Terrestrial Habitats with either the UWF 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 Cumulative Evaluations (Section A2.1.4.7).

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

8.5.2.2.1 Potential for Impacts to Terrestrial Habitats

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Terrestrial Habitats. The results of this evaluation are included in Table 8-40.

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

Table 8-40: 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: Neutral effect/No potential for effects due to: Seven habitat types comprising 11.6Ha were recorded within the UWF Replacement Forestry study area. The dominant habitats present are improved agricultural grassland (GA1), Wet Grassland (GS4) and conifer plantation (WD4) which together make up 10.4Ha or 89% of all habitats present within the UWF Replacement Forestry study area. Scrub (WS1) and built land and artificial surfaces (BL3) make up the majority of the remaining habitats (9%). Linear habitats are primarily composed of spoil and bare ground (ED2), tree lines (WL2), hedgerows (WL1) and earth banks (BL2). The total area of linear hedgerow and treelines (or mosaics of both), comprises 134m within the UWF Replacement Forestry site. No non-native invasive plant species were recorded. Terrestrial Habitats of Local Importance, Higher Value within the UWF Replacement Forestry site are wet grassland (GS4), broadleaf woodland (WD1) and Scrub (WS1). Linear hedgerow and tree lines (or mosaics of both) within the Replacement Forestry site are evaluated as of Local Importance, Higher Value. • Neutral habitat loss due to the small extent of Wet Grassland (Local Importance (Higher Value) which will be planted with native woodland, which will have at least as high an importance rating, • No potential for hedgerow severance impacts as zero hedgerow is to be removed, • No potential for loss of High Nature Value trees, as no mature trees will be removed, • No potential for cross factor habitat degradation effects, as effects to Local Surface Water Bodies will not be greater than imperceptible, and no likely effects to Local Groundwater Bodies is expected.

	• No direct loss of Flora Protection Order species, as none were recorded at the site, • No fragmentation is expected from UWF Replacement Forestry with positive effects likely to accrue, • No likely spread of invasive species as none recorded within the afforestation site. Notwithstanding this point a comprehensive Invasive Species Management Plan has been developed and will be implemented by all personnel at the UWF Replacement Forestry site during its planting and growth stages.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Included for the evaluation of cumulative effects

8.5.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.5.2.3.1 Element 2: UWF Related Works

Terrestrial Habitats within the UWF Related Works Study Area comprise a mosaic of agricultural grassland, commercial forestry plantations, hedgerows, wet grassland, private roads and public roads.

Twenty-two habitat types (including six types of habitat mosaic) comprising 190.5Ha were recorded. The dominant habitats present are GA1: Improved agricultural grassland (113.38ha or 59.5%), followed by WD4: Conifer plantation (45.45ha or 22%), both of which are evaluated as Local Importance (Lower Value). The remaining habitats (18.5% in total) are mainly made up of: Wet Grassland (GS4), Scrub (WS1), built land and artificial surfaces (BL3), Wet Heath (HH3) and Upland Blanket Bog (PB2). Linear habitats are primarily composed of Buildings and Artificial Surfaces (BL3), earth banks (BL2), and Erod-ing/Upland Rivers (FW1).

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

- 693 meters of Upland/Eroding Rivers (FW1),
- 2.03ha of Upland Blanket Bog (PB2),
- 11.95ha of Wet Grassland (GS4),
- 1.77ha of Scrub and Immature Woodland (WS1/2),
- 2.32ha of Wet Heath (HH3),
- 1.58ha of Dry-humid Acid Grassland (GS3),
- 0.11ha of Dry Siliceous Heath (HH1),
- 0.1ha of Cutover Bog (PB4),
- 1,611 meters of Linear hedgerow (WL1) / treelines (WL2).

Respective areas of each habitat type (evaluated as of Local Importance (Higher Value) or above) are illustrated in Figure WP 8.5: Whole Project Study Area for Terrestrial Habitats (Overview and Maps 1 to 4) and presented in full in Appendix 8.3: Terrestrial Habitats Survey Results & Impact Calculations (Section A8.3.2.3) in Volume C4 EIAR Appendices.

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

Non-native invasive plant species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are herein described. A Japanese knotweed or Himalayan knotweed infestation was recorded at 1 location during habitat assessments for UWF Related Works. The infestation is located greater than 7 metres from the construction works area boundary.

8.5.2.3.2 Element 3: UWF Replacement Forestry

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

8.5.2.3.3 Element 4: Upperchurch Windfarm

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

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

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

Consideration of the Passage of Time: the 2013 planning documents were reviewed and habitats on the Consented Upperchurch Windfarm site were observed during surveys for UWF Related Works. With the exception of some maturation of trees, there have been no material changes in the makeup of terrestrial habitats on the windfarm site, and it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this EIAR for UWF Grid Connection. Furthermore, the maturity of trees on the windfarm site has been taken into account in the relevant cumulative evaluations in this 2019 EIAR for UWF Grid Connection.

8.5.2.3.4 Element 5: UWF Other Activities

Haul Route Activity Locations

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

The total area of linear hedgerow and treelines (or mosaics of both) present comprises 2,031m.

Japanese knotweed was recorded c.15m from the haul route location HA15 on the R503 east of Ballycahill. This was the only record of non-native invasive plant species associated with the UWF Other Activities survey corridor. The infestation is located at a distance greater than the root spread for this species (i.e. 7 metres) to the activity location.

Upperchurch Hen Harrier Scheme Area

A total of 128 Hectares of land has been put forward as alternative habitat for the Upperchurch Hen Harrier Scheme. The habitat types are a mixture of wet grassland (GS4) and improved grassland (GA1), with some smaller areas of willow scrub. We refer to the consented Upperchurch Windfarm Ecological Management Plan (2013) for further information in this regard (contained in Volume F9: Reference Documents).

Overhead Line Activities

A total of 18 habitats were recorded within a 50-metre buffer of the Overhead Line Activities. The majority of the study area was composed of improved agricultural grassland. See Table 10 Appendix 8.3 Terrestrial Habitats Survey Results & Impact Calculations for further detail.

8.5.2.3.5 Other Projects or Activities:

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

8.5.2.4 Cumulative Information Baseline Characteristics - Importance of Terrestrial Habitats

8.5.2.4.1 UWF Related Works:

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

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

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

BL3: Buildings and artificial surfaces (based on importance to bats),

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

8.5.2.4.2 Upperchurch Windfarm

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

8.5.2.4.3 UWF Other Activities

Haul Route Activity Locations

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

Overhead Line Activities

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

8.5.3 PROJECT DESIGN MEASURES for Terrestrial Habitats

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

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

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

The Project Design Measures outlined in Table 8-41 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Terrestrial Habitats**.

Table 8-41: UWF Grid Connection Project Design Measures relevant to Terrestrial Habitats

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).
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.
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.
PD57	All excavation works will take place in line with protective measures required to avoid damage to trees during the construction phase of road projects, as stipulated in the NRA document 'Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub prior to, during and post construction of National Road Schemes'. This will include consultation with a qualified arborist, where appropriate to ensure works within the Root Protection Area (RPA) avoid any significant damage to tree roots. Exposed tree roots will be protected where required and excavation methods will be appropriately undertaken so as to avoid damage to RPA's. All excavation works in the RPA will be overseen by the Project Ecologist.

Terrestrial Habitats

Sensitive Aspect

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.

Biodiversity

Topic

8.5.4 EVALUATION OF IMPACTS to Terrestrial Habitats

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

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

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

Table 8-42: List of all Impacts included and excluded from the Impact Evaluation Table sections

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

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

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

8.5.4.1 Impact Evaluation Table: Reduction in Terrestrial Habitats

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Works, new hardstanding areas, storage of materials
Cumulative Impact Source: Excavation works, ground clearance, new hardstanding areas, materials storage
Impact Pathway: Land Cover

Impact Description: Land take during the construction stage will cause a direct reduction in habitats present. Land take for the UWF Grid Connection development only relates to the Mountphilips Substation site, because all works outside of the Mountphilips Substation site will occur on paved roads. Land cover change for project infrastructure such as permanent roads, permanent berms and the Mountphilips Substation and the two new End Masts will reduce the respective area of some higher value habitats or habitats which are important from a Biodiversity perspective. In order to facilitate the replacement of existing culverts along the public road, where required, the removal of a minimal area of roadside vegetation may be necessary, this however will be a reversible and temporary land cover change of negligible extent.

As per Best Practice all habitats described and evaluated herein are those evaluated as of Local Importance (Higher Value) and above - we note that no habitats evaluated as of County, National, or International Importance are affected by permanent land cover change.

No permanent Land cover change will occur within the Slievefelim to Silvermines Mountain SPA or within the Lower River Shannnon SAC. UWF Grid Connection will be installed within the public road pavement, with no additional permanent loss or reduction of habitat area within either the SPA or the SAC.

In relation to cumulative impacts, the majority of land cover change for UWF Related Works is temporary in nature with immediate re-instatement for works such as cable trenching and temporary berms, and the use of flagmen at entrances reduces land cover change. Permanent storage berms, located along realigned windfarm roads, will be re-instated immediately with native grasses. All re-instatement will be overseen by the Project Ecologist. Permanent land cover change is associated with the consented Upperchurch Windfarm (new access road, turbine hardstands, and the consented UWF substation), and with UWF Replacement Forestry.

Impact Quality: Negative

Evaluation of Subject Development Impact – Reduction in Terrestrial Habitats
Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Permanent habitat loss will comprise 1.75 ha, limited to 2 no. habitat types; Improved agricultural grassland GA1 (1.7 ha) and **Wet grassland GS4 (0.05 ha)**, which will occur at Mountphilips/Coole. These habitats are evaluated as Local Importance (Higher value), in the case of Wet grassland, and Local Importance (Lower Value) for Improved agricultural grassland. The magnitude of change represents 0.57% of the total habitat within the study area, and 0.85%, and 2.02% respectively of the habitats described. Temporary land-use change of non-linear features at Mountphilips/Coole is limited to 0.23ha of Improved agricultural grassland and 0.04Ha of Wet grassland.

It will be necessary to remove 160m of treeline which includes 17 immature trees and 1 mature tree at the Mountphilips Substation site entrance to widen the entrance and provide sightlines. An equivalent length of new hedgerow with 17 no. semi mature trees (native hedgerow species and at least 10 years old) will be planted behind the new sightlines at the site entrance.

In order to build the new permanent access road to the Mountphilips Substation site it will be necessary to remove 40m of hedgerow which includes 11 immature trees. A new hedgerow, c.700m in length, will be planted on the berms on either side of the new permanent access road between the Site Entrance and Mountphilips Substation and around the Mountphilips Substation compound; the sides of the berms will be seeded with native

grass and wildflower species, for the benefit of biodiversity in the area. All new hedging will be locally sourced native fruiting hedgerow species.
Where the 110kV UGC occurs outside of the Mountphilips Substation site, the works will be confined to road pavements, and there will be no other permanent land-use change associated with the UWF Grid Connection; all other hedgerows and treelines will be retained along the route of the 110kV UGC outside of the Mountphilips Substation site.

Overall magnitude is evaluated as negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The vast majority of the construction works areas (84%) are on paved roads; with the remaining 16% comprising the area of the construction works boundary on agricultural lands at Mountphlilips Substation Site. Overall landuse change relates to 6% of the footprint of the total construction works (i.e. Mountphiliips Substation site and 110kV UGC). The 6% only relates to land-use change at the Mountphilips Substation site;
- At Mountphilips Substation site, 1.7 ha land cover change is Improved agricultural grassland which has been evaluated as having local importance (lower value);
- The low sensitivity of the habitats for which land-use change will occur
- In the context of the extent of higher value habitat in the wider surrounding area (context), and;
- The extremely limited extent (0.1ha) of semi-natural habitat lost (wet grassland), with the majority of lost habitat consisting of lower value Improved agricultural grassland.
- Very slight change to overall biodiversity value from baseline conditions, notwithstanding;
- The permanent duration, and;
- Low reversibility with permanent land cover change likely

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative impacts relates to the part of the UWF Grid Connection Cumulative Study Area which overlaps the UWF Related Works/Upperchurch Windfarm area, at the eastern extent of the 110kV UGC. The 110kV UGC is entirely located within paved road surfaces in this area, which is a Local Importance (lower value) habitat. In addition the road surfaces will be reinstated following the completion of works for the 110kV UGC. No cumulative effects on terrestrial habitats will accrue.
The cumulative impact magnitude is evaluated as negligible.

Significance of the Impact: No Cumulative Impact

Rationale for Impact Evaluation:

- The local importance (lower value) of the habitat within the overlap area – i.e. paved roads;
- The temporary nature of works and reinstatement of the paved road surfaces.

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

Element 2: UWF Related Works

Impact Magnitude:
No habitats evaluated as of County, National or International Importance will be lost.
Permanent habitat loss relates to 1 no. habitat type, Wet grassland GS4 (0.07Ha), evaluated as of Local Importance (higher value). The magnitude of change represents 0.6% of the total 11.95Ha of Wet Grassland habitat within the UWF Related Works study area. The impact magnitude is evaluated as negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The local importance (higher value) of the habitats lost;
- The low sensitivity of the habitats for which change will occur (context), and;

Terrestrial Habitats

Sensitive Aspect

- The extent of Habitat Loss, with none of the individual habitat changes representing more than 5% of the respective habitat present, which is;
- Very slight change from baseline conditions, notwithstanding;
- The long term duration, and;
- Low reversibility with permanent land cover change likely.
- The local importance (higher value) of the habitats lost;

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
According to the 2013 EIS and the An Bord Pleanála Inspectors Report In terms of the habitat loss arising from the construction of roads, foundations and hardstandings, this was determined as 9.65Ha, primarily in the Improved Agricultural Grassland (GA1 - 5.98Ha) and conifer plantations (WD4 - 1.18Ha). 7.81Ha of this habitat was identified as Higher Value, 77% of which is Improved Agricultural Grassland (GA1). The scale of land cover change is 1.4% of available habitat within the Study area boundary of 536Ha.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- According to the An Bord Pleanála Inspectors Report "In relation to the details submitted, I consider that the potential impact on habitats on the site is not therefore significant. The impacts largely occur on areas with a long history of human intervention through farming and forestry cultivation. I also consider that subject to the mitigation measures as outlined that the proposed development is not likely to result in significant impacts and effects on any designated sites."

Element 5: UWF Other Activities

Impact Magnitude: None

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- No permanent land cover change is proposed of Terrestrial Habitats evaluated as of Local Importance (Higher Value) or greater.

Evaluation of Other Cumulative Impacts – Reduction in Terrestrial Habitats

Whole UWF Project Effect

Magnitude:
No habitats evaluated as of County, National or International Importance will be lost.
Permanent habitat loss relates to 1 no. habitat type, Wet grassland GS4 (0.07Ha), evaluated as of Local Importance (higher value). Habitat loss of Local Importance (Higher Value) in respect of the UWF Grid Connection (0.05Ha), the UWF Related Works (0.07Ha) and Upperchurch Windfarm (7.81 Ha, of which 5.98ha relates to Improved Agricultural Grassland which is considered by the authors to be of Lower Value, in accordance with Fosset (2000)).

Significance of the Whole Project Effect: Not Significant

Rationale for Impact Evaluation:

- The overall extent of Habitat Loss, and;
- Changes from baseline conditions are very slight-minor, notwithstanding;
- The long term to permanent duration, and;
- Low reversibility with permanent land cover change likely.

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

8.5.4.2 Impact Evaluation Table: Hedgerow Severance

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Works, entrance works, access road
Cumulative Impact Source: Excavation Works, Access roads, Ground Clearance.
Impact Pathway: Land cover

Impact Description: Construction stage works will cause both 160m of temporary and 40m of permanent severance of existing field boundaries at the Mountphilips Substation site, with temporary loss at the site entrance off the public road, and permanent loss at hedgerow intersections along the new permanent access road. Permanent severance if of sufficient magnitude may affect habitat connectivity.

The other elements of the Whole UWF Project will also cause temporary and permanent severance of field boundaries, this is primarily to facilitate the cabling as part of UWF Related Works (315m of temporary) and to facilitate entrances and access roads for Upperchurch Windfarm (980m of permanent). Any temporary hedgerow loss, such as at field boundary crossings and at entrances, will be immediately re-instated once works are complete with like for like vegetation and therefore Neutral effects are considered likely. Project Design Measures such as the use of flagmen at entrances *(for UWF Related Works)* has reduced the extent of field boundaries to be removed, even if only temporarily.

As per Best Practice all habitats described and evaluated herein are those evaluated as of Local Importance (Higher Value) and above - we note that no hedgerows or field boundaries were evaluated as of County, National, or International Importance. This is reflective of the landscape present with many field boundaries comprising earthen banks, or lower value hedgerows.

Hedgerow creation: The Upperchurch Hen Harrier Scheme (part of UWF Other Activities) is to incorporate significant planting of hedgerows (2.8km of new planting). New hedgerows will also be planted as part of the UWF Grid Connection (700m of new hedgerow at the Mountphilips Substation site), UWF Related Works (370m new planting) and Upperchurch Windfarm (360m new planting).

Impact Quality: Negative and positive

Evaluation of Subject Development Impact – Hedgerow Severance

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
It will be necessary to remove 160m of hedgerow which includes 17 immature trees and 1 mature tree at the substation site entrance to widen the entrance and provide sightlines. These will be reinstated by planting the equivalent amount of hedgerow and trees behind the new sightlines, so effective habitat loss will be temporary in extent and duration.

It will be necessary to remove 40m of hedgerow which includes 11 immature trees to build the new permanent access road. A new hedgerow, c.700m in length, will be planted on the berms on either side of the new permanent access road between the Site Entrance and Mountphilips Substation and around the Mountphilips Substation compound; the sides of the berms will be seeded with native grass and wildflower species, for the benefit of biodiversity in the area. All new hedging will be locally sourced native hedgerow species, and the replacement trees will be native hedgerow species and at least 10 years old. With reinstatement any effect on habitat connectivity is evaluated as of negligible magnitude. No hedgerow severance will occur outside of the Mountphilips Substation site.

The magnitude of impact is evaluated as being negligible, due to reinstatement of trees of at least 10 years in age.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Hedgerow severance to create sightlines will be replanted immediately behind the new sightlines at the entrance to avoid fragmentation effects, so effective habitat loss will be temporary in extent and duration;
- The very low extent of permanent severance (40m permanent loss), with;
- Net gain due to 700m of new hedgerow planting along the new permanent access road and around the substation compound at Mountphilips Substation site.
- No noticeable adverse contrast with baseline conditions is expected, when considered with proposed new planting;

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is no potential for cumulative impacts due to the separation distance (c.22km) between hedgerow severance/planting at Mountphilips and hedgerow severance/planting for the Other Elements of the Whole UWF Project.

Significance of the Impact: No cumulative impact

Rationale for Impact Evaluation:

- Separation distance (c.22km) between hedgerow severance/planting at Mountphilips and hedgerow severance/planting for the Other Elements of the Whole UWF Project.

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

Element 2: UWF Related Works

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

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The low extent of severance, with most field boundaries comprising earthen banks, and;
- No individual severed sections evaluated as sufficient in magnitude to result in fragmentation effects, and;
- Very slight change from baseline conditions, and;
- Reinstatement ensuring some habitat loss is temporary in duration, notwithstanding;
- The long-term duration of some permanent change.

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

Element 4: Upperchurch Windfarm

Impact Magnitude:

- As per the windfarm EIS, 980m of hedgerow will be removed.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

Terrestrial Habitats

Sensitive Aspect

- As per the Upperchurch Windfarm EIS (2013), the impact of hedgerow severance is evaluated to be not significant: "However the extent (*of irreversible hedgerow loss*) is relatively low particularly as there is an abundance of this habitat and many of the hedgerows dividing fields have very little cover within the region. Therefore, it is near certain that the impact on this habitat will not be significant."

Element 5: UWF Other Activities

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

Significance of the Impact: Significant (positive)

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

Evaluation of Other Cumulative Impacts – Hedgerow Severance

Whole UWF Project Effect

Magnitude:
Permanent hedgerow loss will occur both at the western side of the Slievefelim to Silvermines Mountain uplands area at the Mountphilips Substation site (UWF Grid Connection), and on the eastern side of the upland area at the UWF Related Works and Upperchurch Windfarm sites.

Total permanent hedgerow loss will be 1020m across the Whole UWF Project, the majority of which relates to Upperchurch Windfarm (980m), with the remaining 40m at Mountphilips Substation site.

Temporary hedgerow/field boundary removal relates to 160m at the Mountphilips Substation site entrance with an additional temporary 315m within the UWF Related Works Study Area, much of which comprises earthen banks.

In total 4.23km of new hedgerow will be planted within the Whole UWF Project study area, including 700m along new permanent access road to Mountphilips Substation (UWF Grid Connection) on the western side of the upland area, and c.370m for UWF Related Works, 360m for Upperchurch Windfarm, and 2800m for UWF Other Activities on the eastern side of the upland area.

Significance of the Whole Project Effect: Not Significant

Rationale for Impact Evaluation:
- The extent of Habitat Loss overall, with limited removal of trees and;
- Individual severance locations will not result in any corridor fragmentation, and;
- Very slight to minor change from baseline conditions, additionally;
- Significant positive effects from Hedgerow enhancement and planting of 2.8km of new hedgerows in the Upperchurch area will occur as a result of the Upperchurch Hen Harrier Scheme, over the lifetime of the project, notwithstanding;
- The long-term duration, and;
- Low reversibility with land cover change likely

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

8.5.4.3 Impact Evaluation Table: Loss of High Nature Value Trees

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Works, vegetation clearance for site entrance works and access road works
Cumulative Impact Source: Excavation Works, vegetation clearance works
Impact Pathway: Land cover

Impact Description: Habitats including mature trees such as hedgerows, treelines, deciduous woodland and scrub are herein evaluated for loss of mature trees of biodiversity value or immature trees which have the potential to be of high value. Construction stage works will cause both temporary and permanent loss of existing field boundaries. Permanent loss of mature trees may affect connectivity / result in fragmentation and have secondary effects on other species which utilise mature trees for breeding or resting (such as birds or mammals). Protection of trees not removed but occurring within or adjacent to the construction works, and which may be affected by secondary or cross factor sources such as excavation operations will be given protection through adherence to a project design measure (based on industry best practice) for the protection and preservation of tree roots during the construction phase (PD57). Trees evaluated herein are of Local Importance (Higher Value) in accordance with their respective habitat classification.

We note that the Upperchurch Hen Harrier Scheme is to incorporate significant planting of trees, in addition the UWF Replacement Forestry will comprise deciduous trees in its entirety.

Impact Quality: Negative and positive

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Tree loss is limited to the Mountphilips Substation site, where 1 no. mature trees of Ash (*Fraxinus excelsior*) and 28 immature trees comprising Ash (n=16), Sycamore (n=1), Oak (n=3) and Hazel (n=8) will be removed along the site entrance and access road to Mountphilips Substation location. A 230m section of road at Scrageen where a small area of Oak-birch-holly woodland was found to correspond to the EU Habitats Directive 92/43/EEC habitat, 'Old sessile oak woods with Ilex and Blechnum, in the British Isles (91A0)' runs adjacent to the route of the 110kV UGC at Scraggeen, PD measures will protect tree roots at this and any other location where they may occur.

Given only a single mature tree is to be lost and protective measures to avoid secondary effects the magnitude is evaluated as negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The low magnitude of Loss overall, which;
- Will not result in any corridor fragmentation, and;
- Application of project design measure for the protection and preservation of tree roots during the construction phase (PD57)
- No discernable change from baseline conditions, notwithstanding;
- The permanent duration, and;
- Low reversibility with permanent loss likely.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is no potential for cumulative impacts due to the separation distances to the the high nature value trees at the locations for the Other Elements of the Whole UWF Project – i.e.

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c.22km from high nature value trees at Mountphilips Substation site, 16.2km from high nature value trees at Screggan along the 110kV UGC (at Screggan).

Significance of the Impact: No cumulative impact

Rationale for Impact Evaluation:

- Separation distance (between high nature value trees at Mountphilips Substations site and along the 110kV UGC, and the high nature value trees at the locations of the Other Elements of the Whole UWF Project.

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

Element 2: UWF Related Works

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

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The extent of Loss is low overall, and;
- Will not result in any corridor fragmentation, and;
- Very slight change from baseline conditions, notwithstanding;
- The long term duration, and;
- Low reversibility with permanent loss likely

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

Element 4: Upperchurch Windfarm

Impact Magnitude:
Tree loss is Medium and will be limited to 24 no. mature trees - primarily from hedgerow crossing locations and site entrances.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The low magnitude of loss, which;
- Will not result in any corridor fragmentation, and;
- Very slight change from baseline conditions, notwithstanding;
- The long-term duration, and;
- Low reversibility with permanent loss likely

Element 5: UWF Other Activities

Impact Magnitude:
Neutral Effect for Haul Route Activity locations or Monitoring Activity locations as no permanent removal of trees is proposed in respect of these works. The Upperchurch Hen Harrier scheme does include the planting of 2.2 Ha of tree and shrub species in scrub areas, improvement planting with suitable trees and shrub species along existing field boundary hedgerows, and planting of 2.8km of new hedgerows with native trees and shrubs. In addition, 1.4km of woody scrub species will be planted along riparian corridors. No trees will be removed to facilitate Overhead Line Activities as described.

Significance of the Impact: Moderate (positive)

Rationale for Impact Evaluation:

- The extent of replanting of trees, and;
- A significant contrast with baseline conditions is predicted.
- The long-term duration, and;
- Low reversibility.

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Evaluation of Other Cumulative Impacts – Loss of High Nature Value Trees
Whole UWF Project Effect
Magnitude: Tree loss is limited to 26 no. mature and 31 no. immature trees. The majority of tree loss relates to Upperchurch Windfarm, where 24 mature trees will be lost. The remaining tree loss will be 1 no. mature Ash tree and 28 no. immature trees on UWF Grid Connection (at Mountphilips Substation site), and 1 no. mature tree and 3 no. immature trees within the UWF Related Works. Project Design Measures for UWF Grid Connection and Best Practice Measures for UWF Related Works will avoid secondary effects through any potential damage to tree roots where they occur. The Upperchurch Hen Harrier scheme includes the planting of 2.2 Ha of tree and shrub species in scrub areas, improvement planting with suitable trees and shrub species along existing field boundary hedgerows, and planting of 2.8km of new hedgerows with native trees and shrubs. In addition, 1.4km of woody scrub species will be planted along riparian corridors.
Significance of the Whole Project Effect: Moderate (positive)
Rationale for Impact Evaluation: • The extent of replanting of trees, and; • The duration which is long term and over the lifetime of the project, and; • A significant positive contrast with baseline conditions is predicted, with; • Limited reversibility

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

8.5.4.4 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-43 below.

Table 8-43: Description and Rationale for Excluded Impacts to Terrestrial Habitats

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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Movement of soils and machinery	1,2,4,5	Ground-water	Surface or Ground water dependant habitat degradation	Rationale for Excluding; Imperceptible impacts to Local Groundwater Bodies or Local Surface Water Bodies, therefore no potential for significant adverse impacts to local water dependant habitats which may support terrestrial habitats are likely to occur as a consequence of the development of the individual Elements or the Whole UWF Project (refer Chapter 11 Water). Cross-factor effects by virtue of same are accordingly excluded from further evaluation.
Movement of soils and machinery	1,2,4,5	Surface Water	Habitat degradation	Rationale for Excluding; Imperceptible impacts to Local Surface Water Bodies or Water Dependant Habitats are likely to occur as a consequence of the development of the individual Elements or the Whole UWF Project (refer Chapter 11 Water and Sensitive Aspect Aquatic Ecology). Cross-factor effects by virtue of same are accordingly excluded from further evaluation.
Excavation works	1,2,4,5	Soils	Direct loss of Flora Protection Order species	Rationale for Excluding; No Flora Protection Order species were recorded within the Construction Works Boundaries.
Excavation works	1,2, 4,5	Landcover	Landscape level Habitat fragmentation	Rationale for Excluding: Neutral Landscape level effect is predicted. Permanent entrance to Mountphilips Substation will be re-instated; hedgerow crossings for UWF Related Works are narrowed to 5m to avoid/reduce fragmentation effects, Minimal trees are to be removed for UWF Related Works which generally correlates with Consented UWF Roads. Upperchurch Hen Harrier Scheme will increase connectedness through planting of hedgerows/trees. No habitat removal is required for Overhead Line Activities.
Movement of soils and machinery	1,2,4,5	Soils	Introduction or spread of invasive species	Rationale for Excluding: No likely impact Japanese knotweed or Himalayan knotweed infestations were recorded at 17 locations during habitat assessments on the UWF Grid Connection. Giant hogweed (*Heracleum mantegazzianum*) was recorded at one location. Infestations were recorded along the verges of the road corridor within which the UWF Grid Connection is located. The impact can be excluded however, as all construction works will occur on/in the road pavements, and due to the implementation of a comprehensive Invasive Species Management Plan for UWF Grid Connection which includes detailed biosecurity measures based on Best Practice, and in accordance with Best Available

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				Techniques currently utilised for roadworks by Tipperary County Council and Transport Infrastructure Ireland. In addition an Invasive Species Specialist will monitor works adjacent to infestations, to ensure the Invasive Species Management Plan (ISMP) is fully adhered with. This will avoid both direct effects from the UWF Grid Connection alone, but also in combination effects with other project elements. The implementation of the final ISMP will be a contractual obligation on any appointed contractors. The Invasive Species Management Plan is included in Volume D: Environmental Management Plan for UWF Grid Connection. In relation to UWF Related Works, A knotweed infestation was recorded at 1 location during habitat assessments on the UWF Related Works. The infestation is located at a distance greater than 7 metres of the haul route realignment construction works area boundary. Effects can be excluded by virtue of Distance and an Invasive Species Management Plan which has been developed for the UWF Related Works Revised EIAR 2019 (See Volume F4, Tab5: Reference Documents). Upperchurch Windfarm: Within the 2013 EIS, a single (public roadside) record of Japanese Knotweed was recorded within the study area for the Upperchurch Windfarm. An ISMP has been developed for UWF Related Works – for which locations overlap the consented Upperchurch Windfarm. Best Practice biosecurity measures will be implemented during the construciton of the Consented Windfarm (see Invasive Species Mangement Plan for UWF Grid Connection, Tab 4 of the EMP – Volume D). In addition the temporal implementation of PD measures and the ISMP for the UWF Grid Connection, prior to works commencing on any other project element, will avoid the introduction into the wind farm of any invasive species. Effects can be excluded. UWF Other Activities: Japanese knotweed was recorded c.15m from the haul route location HA15 on the R503 east of Ballycahill. This was the only record of non-native invasive plant species associated with the UWF Other Activities survey corridor. The infestation is located at a distance greater than 7 metres (c.15m) to the activity location. Effects can be excluded.
Operational Stage				
Movement of soils and machinery	1,2,4,5	Soils	Introduction or spread of invasive species	Rationale for Excluding: Operational maintenance for UWF Grid Connection, Upperchurch Windfarm and UWF Related Works are minimal and unlikely to result in the spread of invasive species. Notwithstanding this a comprehensive Invasive Species Management Plan has been developed for UWF Grid Connection (see Volume D) and will be implemented during operational

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Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				maintenance to ensure that none of the identified Invasive Species infestations poses a risk to the environment, either alone or in-combination. In relation to UWF Related Works/Upperchurch Windfarm/UWF Other Activities: All pertinent locations of Invasive Species are currently >7metres from any operational works/activity areas and therefore impacts are not likely. Notwithstanding, Best Practice biosecurity measures will be implemented during the operational stage of the Consented Windfarm (see Invasive Species Mangement Plan for UWF Grid Connection, Tab 4 of the EMP – Volume D).
Decommissioning Stage				
Movement of soils and machinery	1,2,4,5	Soils	Introduction or spread of invasive species	Rationale for Excluding: UWF Grid Connection will not be decommissioned so no pathways exist for effect where the source magnitude is potentially highest. In relation to UWF Related Works/Upperchurch Windfarm/UWF Other Activities: All pertinent locations of Invasive Species are currently >7metres from any decommissioning works/activity areas and therefore impacts are not likely. Notwithstanding, Best Practice biosecurity measures will be implemented during the operational stage of the Consented Windfarm (see Invasive Species Mangement Plan for UWF Grid Connection, Tab 4 of the EMP – Volume D).

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8.5.5 Mitigation Measures for Impacts to Terrestrial Habitats

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

8.5.6 Evaluation of Residual Impacts to Terrestrial Habitats

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

8.5.7 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 a Invasive Species Specialist.

8.5.7.1 Invasive Species Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Invasive Species Management Plan developed to prevent/avoid the introduction and/or spread of invasive species. The Invasive Species Management Plan includes Best Practice biosecurity measures and describes supervision by an Invasive Species Specialist during the construction phase.

8.5.8 Summary of Impacts to Terrestrial Habitats

A summary of the Impact to Terrestrial Habitats is presented in Table 8-44.

Table 8-44: Summary of the impacts to Terrestrial Habitats

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

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

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

8.6 Sensitive Aspect No.5: Hen Harrier

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

Dr. Alex Copland, Chris Cullen and Howard Williams were the main authors of this Section. Please see Sources of Information (Section 8.1.7) and Methodology (Section 8.1.8) for details of the desktop and fieldwork surveys which have informed the evaluation of Hen Harrier.

8.6.1 BASELINE CHARACTERISTICS of Hen Harrier

8.6.1.1 STUDY AREA for Hen Harrier

The study areas for Hen Harrier in relation to the UWF Grid Connection is described in Table 8-45 and illustrated on Figure GC 8.6.1: UWF Grid Connection Study Area for Hen Harrier (Volume C3 EIAR Figures).

Study areas have been derived from sources such as published literature on Hen Harrier, in addition to Best Practice Guidance available within the Irish and UK Guidance, in particular Scottish Natural Heritage (SNH).

Table 8-45: UWF Grid Connection Study Areas for Hen Harrier

Study Areas for Hen Harrier	Justification for the Study Area Extents
1. Within 2km from the UWF Grid Connection construction works area boundary in all directions, for breeding sites (confirmed nest site or centre point of observed evidence of breeding behaviour identified during the breeding season), territories, availability of foraging (hunting) habitats and communal winter roost sites; 2. Within 2km of identified nests in relation to the availability of suitable breeding and foraging Habitat 3. Within 150m of the UWF Grid Connection construction works area boundary in all directions- in relation to disturbance displacement to foraging Hen Harrier during the breeding season, and effective habitat loss as a result. 4. Within 150m of the UWF Grid Connection construction works area boundary in all directions in relation to secondary effects via reductions in Prey Item availability. 5. Within 50m of the UWF Grid Connection construction works area boundary in all directions in relation to habitats proximal to the general settings of works.	1. The extent of the study area is defined in accordance with SNH Guidelines (2017[16]), the use of the centre point of observed evidence to determine nest site is based on the Hen Harrier Project (2019[17]). 2. Foraging habitat loss within 2km of a Hen Harrier nest may potentially have negative effects on breeding success (Arroyo *et al.,*2014). Habitat composition at this scale has previously been interrogated in research in the Irish context to investigate nest site selection at a landscape scale (Wilson *et al.* 2010). 3. 150m is the Minimum Approach Distance (MAD) (Livesey *et al.,* 2016) indicated for likely disturbance in respect of Falconiformes (the family of birds with characteristics most similar to Hen Harrier). 4. Professional Judgement, based on the MAD recommended for Hen Harrier as outlined at 2. above. 5. Professional Judgement and as per Best Practice (CIEEM, 2016)

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

[17] Hen Harrier Project, (2019). *HARRIER HEN PROGRAMME Terms and Conditions 2nd Edition April 2019.* Hen Harrier Project, Oranmore, Co. Galway. Note 6, Pg. 22.

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

8.6.1.2.1 Character

The harriers (genus *Circus)* are all fairly large hawks with long, broad wings, long tails and legs and slim bodies (Watson 1977). The Hen Harrier *Circus cyaneus* is a medium sized, ground nesting bird which is specifically suited to foraging (hunting) at low height over open ground containing preferred prey species. Their long wings and hunting technique does not equip them for hunting in closed woodland. They were once widespread throughout Ireland but by the early 20th century their numbers had been substantially reduced (O'Flynn, 1983).

In Ireland the Hen Harrier is confined largely to heather moorland and young forestry plantations, where they nest on the ground. They are found mainly in Counties Laois, Tipperary, Cork, Clare, Limerick, Galway, Monaghan, Cavan, Leitrim, Donegal and Kerry. The current national breeding population is estimated at 108 - 157 breeding pairs (Ruddock *et al.,* 2016). The most recent estimate of the national wintering population, from Irelands Article 12 submission to the EU, is 269-349 individuals. Wintering birds may comprise native breeding birds but also birds from overseas which visit Ireland during the winter months (Wernham *et al.*, 2002; Etheridge & Summers, 2006).

Ireland holds the most westerly breeding population of Hen Harrier in Europe.

It has been shown in Ireland (Wilson *et al*., 2006) that breeding Hen Harriers avoid areas where less than 30% of the landscape comprises suitable habitats such as bog (used for foraging and nesting), rough pasture (used for foraging) or young forest (used for foraging and nesting).

Studies have also shown that Hen Harrier demonstrate high nest fidelity (faithfulness) and use nest sites on a traditional basis (which may include different birds using sites on an annual or irregular basis over many years (e.g. Amar & Redpath, 2002, Hardey *et al.,* 2014).

The mechanism for the selection of nesting sites by Hen Harrier is not perfectly understood and is thought to relate to micro-climatic and habitat variables (e.g. shelter, aspect, vegetation present at the actual nest location) as well as macro-habitat determinants (larger scale landscape related influences such as showing a preference for open moorland, heath, young conifer etc.) (Redpath *et al*., 1998; Wilson *et al*., 2009).

Hen Harrier foraging habitat preferences during the breeding season are generally biased towards moorland, grassland mosaics and pre-thicket forest habitats which support larger numbers of prey species. Ruddock *et al.*, 2016, reported that Hen Harrier were more frequently recorded foraging over heather moorland (30%), second rotation forest (18.7%), rough grassland (12.4%) and thicket stage forest (12.4%). In a published study of 900 Hen Harrier pellets in Ireland covering winter and breeding seasons, Hen Harriers were found to have a diverse diet, which varies between areas and seasons and includes small mammals, birds, amphibians and reptiles - up to 78% of the diet of Hen Harriers in Ireland was shown to comprise passerine species of birds (Irwin *et al.,* 2012).

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Hen Harrier are considered as 'central-place' foragers with most foraging taking place during the breeding season within a 'core range' of 2km from nests (SNH, 2018, Irwin *et al.* ,2012). During the breeding season females hunt closer to nest locations (typically <1km) whereas males hunt further away (Arroyo et al., 2006). In a remote tracking study in the Irish context, the concentration of Hen Harrier hunting behaviour was more than 10 times higher within 1 km of the nest than it was between 2 and 5 km from the nest (Irwin *et al.* 2012).

Hen Harrier wintering grounds are typically lowland sites below 100m. During winter, Hen Harriers gather at communal or solitary roost sites. In Ireland the majority of these roost sites are located in reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse or saltmarsh. Approximately 20% of known roosting sites in Ireland occur within close proximity to core nesting areas. In 2014, approximately 96 confirmed solitary and communal roosts were known in Ireland, and were estimated to support between

219 – 313 individuals (B. O'Donoghue, pers comm cited in NPWS, 2015). Within continental Europe maximum numbers of up to 50 birds have been recorded at winter roosts, and in the Irish context, up to 10 birds has been documented (Watson, 1977). Winter hunting grounds cover a much wider range and greater variety of habitats than Summer (Watson, 1977).

8.6.1.2.2 Context

The UWF Grid Connection comprises the Mountphilips Substation site, which is located to the west of the Slieve Felim & Silvermine Mountains upland area, and the 110kV UGC which is routed from the Mountphilips Substation to the already consented Upperchurch Windfarm (UWF) Substation to the east of the upland area. The Mountphilips Substation is not located within the SPA; however, the 110kV UGC, which is 30.5km in length, passes through the boundary of the SPA for 8km in total. Where the 110kV UGC is routed outside of the Mountphilips Substation site (including through the SPA area), the 110kV UGC is entirely located within paved roads. The public road in question, through the boundary of the SPA, is the aforementioned Regional Road R503 which links Thurles to Limerick city.

The landcover of the surrounding upland area is predominately agricultural grassland and commercial forestry, with regional and local roads occurring throughout connecting the towns of Thurles, Nenagh, Cappawhite, Cappamore, Tipperary Town, Newport and Limerick city, in addition to several smaller villages such as Hollyford, Upperchurch, Kilcommon, Rear Cross, Murroe, Doon and Silvermines.

This upland area also includes the Slievefelim to Silvermines Mountain Special Protection Area (SPA), which is a European Site designated under the EU Birds Directive (2009/147/EC) of special conservation interest for Hen Harrier.

The Slievefelim to Silvermines Mountain SPA as a whole covers 20,917ha[18], has held between seven (2010) and ten (2015) pairs of nesting Hen Harrier (Ruddock *et al*., 2016), and is considered one of the strongholds for Hen Harrier in the country. The SPA has a high proportion (70%) of suitable habitat, totalling 14,552ha (extrapolated from data in Moran & Wilson-Parr, 2015). Within the SPA, nesting Hen Harriers have shown a preference to nest in the early stages of new and second-rotation conifer plantations, though some pairs may still nest in tall heather of unplanted bogs and heath[19]. Hen Harrier surveys, carried out between 2016 and 2019 for the UWF Grid Connection, found that Hen Harriers within the UWF Grid Connection Study Area all nested within this SPA – no nests were recorded outside of the SPA boundary.

In terms of the proposed development, the Mountphilips Substation is not located within the SPA; however, the 110kV UGC, which is 30.5km in length, passes through the boundary of the SPA for 8km in total. Where the 110kV UGC is routed outside of the Mountphilips Substation site (including through the SPA area), the 110kV UGC is entirely located within paved roads. The public road in question, through the boundary of the SPA, is the aforementioned Regional Road R503 which links Thurles to Limerick city. In relation to traffic volumes, while the R503 is not a congested road, there is some variation in traffic usage along the route dependant on proximity to local facilities such as schools, with traffic levels higher nearer to Newport. There are 317 houses and 17 community facilities within 100m of the route of the 110kV UGC.

[18] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004165.pdf
[19] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004165.pdf

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8.6.1.2.3 SPA Connectivity

Guidance is available from Scottish Natural Heritage (SNH) to assist in establishing levels of connectivity to designated SPA's. Connectivity distances per species included are set out from a literature review that examined ranging behaviour. SNH specifically recommends that "*in most cases the core range should be used when determining whether there is connectivity between the proposal and the qualifying interests*". A core foraging range of 2km from nests sites during breeding is presented for Hen Harrier in this Best Practice Guidance (SNH 2018).

As the proposed development passes through the boundary of the SPA for over 8km, connectivity is assumed.

8.6.1.2.4 Nearest Nesting Sites to UWF Grid Connection

In line with the justification as set out in Table 8-45, nests within 2km of the proposed development have been identified for the current appraisal over a study period spanning 2017-2019 inclusive. However, a precautionary approach has been taken to include the presentation of nest data out to 3km from the proposed development – this reflects that in certain instances the central point of observed breeding activity is often variable within a breeding season or inter-annually, and due to this potential for variation, it is considered that this more comprehensive, precautionary approach is required for completeness.

Methods for the current study included a systematic review of desktop information, consultation with local experts and NPWS and fieldwork in line with Best Practice methods. The results of previous Hen Harrier surveys (2016, 2017 to inform the previous 2018 UWF Grid Connection planning application PL92.301959), and 2019 fieldwork to identify breeding behaviour (in April 2019) and active nests (in June and July 2019) within the study area are presented. For the purpose of this appraisal, all confirmed nests and /or centre points of observed breeding behaviour are considered as nesting attempts, in line with a precautionary approach[20] and established Best Practice in the evaluation of nesting attempts (see Section 8.1.8.8).

For the avoidance of doubt, although studies conducted in 2016 and 2017 were in relation to a different 110kV UGC route for the previous 2018 UWF Grid Connection application (PL92.301959) and therefore different study extent, consultation with local experts and NPWS was undertaken in 2019 for the current appraisal to determine whether or not additional nests were known from any areas outside the prior study extent. Results of this consultation was used to scope possible territories requiring survey in 2019 (within 2km of the now proposed route of the 110kV UGC) in line with Best Practice (Hardey *et al.,* 2014) and for which the results are herein presented. Based on information on nest territories in 2016-2018 obtained through consultation, the 2019 study results which confirm the location of these previously identified territories, and the cautionary approach in assigning nest status to any observed breeding activity, data presented herein is considered complete and sufficient to inform the evaluation of likely significant effects.

Hen Harrier nests and/or nesting attempts for the period 2016-2019 and within 3km of the proposed development are shown in Table 8-46. In general terms there are 7 traditional nesting territories within and up to 2km from the proposed development (A-G) - with a further 3 traditional territories within 3km (H-J); i.e. 10 traditional territories in total within 3km. Not all of these are occupied in any given year, however, with, for example, only 7 of the 10 territories confirmed as active during the 2019 breeding season.

For the period 2016-2019, 9 nests were recorded within 2km, with a further 3 nests within 3km, and 1 nest at 3.2km from the development (13 nests in total), all of which were located on lands within the SPA boundary, (note that nest locations G1, G2 and G3 are considered to be the same occupied territory, as are locations H1 and H2, with slight inter-annual variation in the exact nest location within that territory). Four

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[20] Not all breeding activity observed potentially becomes a breeding attempt- however a precautionary principle is applied.

of the seven active territories identified in 2019 had successful nests (i.e. these were still active in July 2019 having either recently fledged young or with large chick(s) still in the nest at that time).

In line with Best Practice, the background mapping, townlands, geographical context, precise locations of nests are not provided, to protect Hen Harrier, however the approximate core ranges are identified on Figures GC 8.6.2.1 to GC 8.6.2.10: Habitat Suitability within the Core Foraging Range of Hen Harrier Nests.

Table 8-46: Identified Hen Harrier Nests within 3km of the proposed UWF Grid Connection, 2016-2019

Nest	Distance to UWF Grid Connection (km)	Most recent year when active
A	0.6	2016
B	1.0	2019
C	0.9	2019
D	1.5	2019
E	1.8	2019
F	2.0	2019
G1 G2 G3	1.8 2.0 1.9	2019
H1 H2	*2.6* *3.2*	2019
I	*2.4*	2016
J	*2.6*	2017

With regard to proximity to works and therefore exposure to source impact pathways for possibly significant effects, the closest identified nest in any year to the proposed UWF Grid Connection development was 0.6km away (breeding territory A in 2016), with the closest active nest (or centre-point of a territory) in 2019 0.9km from the nest (breeding territory C).

No nest occurs closer than 600m to the proposed development. No nests were recorded within 2km of the Mountphilips Substation site, with the nearest nest being 4.6km from Mountphilips (Nest A in 2016).

8.6.1.2.5 Nesting Habitat in the UWF Grid Connection Study Area

As noted earlier, Hen Harrier are essentially central place foragers, with most foraging taking place during the breeding season within 2km of nests. They are also faithful to traditional nesting sites or territories and regularly nest year after year in the same general location (Hardey *et al.,* 2014). The heretofore identified nests (A-J) are therefore reasonably considered to accurately reflect any short-term nesting or likely nesting territories which may overlap the proposed time period for construction.

Nevertheless, cognisance is being given in the current evaluation to the general availability of nesting habitat, within 2km of the proposed development, notwithstanding whether Hen Harrier territories have been recorded within this area. This is to provide contextual information on the general availability of nesting habitats and to allow for evaluation if required of the degree of displacement habitat available for nesting harrier within the study zone stipulated in Guidance.

All habitats within 2km of the proposed UWF Grid Connection development (whether within the SPA or outside the SPA) were evaluated for their suitability as nesting habitat for Hen Harrier. Habitats identified as suitable for nesting by Hen Harriers within 2km of the proposed UWF Grid Connection were wet grassland, peatland habitats (including heath), scrub, dense bracken and both pre- and post-thicket forestry (as per

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Ruddock *et al*., 2016). Habitats considered unsuitable for nesting included agricultural grasslands (including improved grasslands and rough grazing), clearfell, hedgerows and treelines (Ruddock *et al*., 2016).

Of the 8,343ha of lands present within 2km of the proposed UWF Grid Connection development, 3,580ha (43%) was considered to provide suitable nesting habitat for Hen Harrier, with 4,763ha (57%) classed as unsuitable. The latter percentage includes all the lands at Mountphilips – there is no suitable nesting habitat at this location.

The availability of suitable habitats within 2km of the proposed UWF Grid Connection therefore exceeds the 30% threshold indicated by Wilson *et al*. (2006) for Hen Harriers to use the landscape.

However, while there is sufficient nesting habitat (43%) to support Hen Harrier within 2km of the UWF Grid Connection, at closer distances to the proposed UWF Grid Connection the habitats are considered to be less attractive at least to nesting Hen Harriers - within 50m of the proposed UWF Grid Connection works for example, all habitats (a total of 340ha), only comprised 38ha (11%) as suitable nesting habitat for Hen Harrier. This undoubtedly reflects the location of the route of the 110kV UGC on primarily public road.

In line with Best Practice, the background mapping, townlands, geographical context, precise locations of nests are not provided, to protect Hen Harrier, however all habitats within 2km of nests are identified on Figures GC 8.6.3: Habitat Suitability within 2km of UWF Grid Connection.

8.6.1.2.6 Foraging habitat within the 2km core range of identified nests

The consideration of the availability of suitable *foraging* habitat is required to determine the likelihood of source impact pathways related to disturbance impacting on foraging Hen Harrier, during the breeding season and potentially resulting in reduced breeding success.

Hen Harriers primarily forage within 2km of the nest, and therefore this core range of 2km around identified nests has been selected for further consideration.

Within this radius of nests *breeding* Hen Harrier will be more susceptible to displacement related effects where sources of disturbance occur within 150m of suitable foraging habitat (based on the Minimum Approach Distance or MAD presented in Table 8-1). A subset therefore of all suitable habitats within 2km of an identified nest location, and which also occur within 150m of proposed works is examined further within Section 8.6.4 Evaluation of Impacts (see also Section 8.6.1.4 Sensitivity of Hen Harrier).

Collectively, the total area of lands suitable for foraging Hen Harrier within 2km of all nests combined comprise 3580ha or 43% of the total lands within 2km of all identified Hen Harrier nests (8343ha). Linear features comprising 255km are also present which may offer foraging opportunities.

On an 'individual territory' basis, none of the 10 regularly occupied territories currently (2019) have less than 33% foraging habitat available (range 33%-54%) within 2km of their individual nest locations (or identified central point of territory).

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As noted, at least 30% suitable habitat is required for an area to be attractive to Hen Harrier. Foraging habitat analysis demonstrate that there is foraging habitat greater than this threshold available within the core foraging range comprising a 2km radius of the nests identified, individually (33% - 54%), collectively (43%) and also on a per territory basis.

In line with Best Practice, the background mapping, townlands, geographical context, precise locations of nests are not provided, to protect Hen Harrier, however all foraging habitat within 2km of nests are identified on Figures GC 8.6.2.1 to GC 8.6.2.10: Habitat Suitability within the Core Foraging Range of Hen Harrier Nests.

8.6.1.2.7 Winter Roosting Habitat in the UWF Grid Connection Study area

In the winter months harriers often roost communally, typically in habitats such as reedbeds and heather less than 100m above sea level (ASL). However, small numbers of communal roosts exist at higher altitudes. Roosts are often traditionally used sites (Clarke & Watson, 1990), and selection of same may not be based on habitat suitability alone, with other factors such as land use change, levels of disturbance, etc. being critical determinants (Clarke & Watson, 1990).

In relation to roost sites, suitable roosting habitats (reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse) are not widely available, with very small fragmented patches of habitat are located within 2km of UWF Grid Connection. Specific roosts are described in Section 8.6.1.2.8 below - it is considered that these comprise the only roost locations likely to be used with sufficient frequency to be considered in terms of possible source impact pathways.

8.6.1.2.8 Winter Roosts in the UWF Grid Connection Study Area

No communal roost was identified within 2km of UWF Grid Connection during 2016-2018 surveys. 1 no. roosts exist at 2.1km from the UWF Grid Connection in Goulmore townland, with 2 further roosts between 3km and 3.6km from the UWF Grid Connection (110kV UGC). Based on desktop review, and the results of scoping and consultation with local NPWS/Hen Harrier surveyors no other roosts have been identified**.** There are therefore no known roosts within the likely zone of effect of the proposed development.

Based on studies conducted for the previous planning application (PL92 .301959) the roost population of the UWF Grid Connection study area was previously estimated as 0-5 birds (based on a maximum of 5 birds recorded concurrently across all roosts on any given day, from 2 winter seasons of effort). This has the potential to increase or decrease dependant on inter-annual variation, weather or other factors. The maximum count of 5 birds at any individual roost (comprising 4 adult males and one female) was only recorded on a single occasion, in January 2018.

Further details on Hen Harrier fieldwork & survey results are included in Appendix 8.4: Hen Harrier Fieldwork & Survey Results.

Further details on Upperchurch Windfarm Hen Harrier surveys are included in Appendix 8.5: Hen Harrier Surveys at Upperchurch Windfarm 2015 - 2017.

Further details on Milestone & Inchivara Wind Farm Hen Harrier surveys are included in Appendix 8.6: Milestone & Inchivara Wind Farm Hen Harrier Survey 2015 2017.

8.6.1.3 Importance of Hen Harrier

Hen Harrier is listed on Annex I of the EU Birds Directive 2009/147/EC. In 2007, six Special Protection Areas (including the Slieve Felim to Silvermines Mountains SPA) were designated across the country with breeding populations of Hen Harrier as the sole Special Conservation Interest to ensure the conservation of the species. The breeding population of Hen Harrier is Amber listed on the most recent Birds of Conservation Concern in Ireland 2014 – 2019 (Colhoun and Cummins, 2013). The Slievefelim to Silvermines Mountain SPA is only designated for breeding hen harrier. Both breeding and wintering Hen Harrier present are evaluated as Internationally Important and assigned a sensitivity rating of **Very High** (in accordance with Section 8.1.8.1 Methodology) for the purpose of evaluation.

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8.6.1.4 Sensitivity of Hen Harrier

8.6.1.4.1 Sensitivity to Habitat Loss

Studies have shown that most foraging takes place within 2km of the nest site, and as per SNH Guidance this is considered the core foraging range for Hen Harrier during the breeding season. The magnitude of effects is distance (to nearest nest) dependant, as both frequency of occurrence and foraging intensity decreases with distance from the nest. Of particular importance and where pathways for likely significant effects are more likely are lands which provide high quality foraging habitat within 2km of nests and on which breeding Hen Harrier (male or female birds) may be dependent during key periods of the breeding cycle such as provisioning young. Loss of suitable habitat may affect breeding success/productivity for one whole cycle, or until vegetation is re-instated both when considered alone and in combination with other possible sources of loss.

8.6.1.4.2 Sensitivity to disturbance

At the nest

Hen Harriers are known to be sensitive to disturbance at the nest (Masden, 2010, Pearce-Higgins *et al.,* 2012). The effects of significant disturbance to Hen Harrier may be nest desertion, reduced incubation periods (resulting in embryo mortality), or additional stress on adult birds due to their propensity to alarm at intruders. Some or all of these effects may result in longer term abandonment of (traditionally held) nesting areas, with resultant local and/or population level effects.

Whilst raptors in general may accept short infrequent disturbance events proximal to nests, and may even be highly tolerant of certain sources of disturbance, sudden changes during critical periods such as the start of the breeding season may provoke a higher level of response (Petty, 1998) with consequent effects on breeding success and local reproductive rates.

Ruddock and Whitfield, 2007, provides background citations from the grey literature on disturbance to Hen Harriers from construction and human activities (e.g. Brown and Amadon 1968, Newton 1979). In addition, the paper cites further references to buffer zone recommendations within the literature, such as Romin and Muck (1999), who recommended a 500m buffer for Northern Harrier, a species very similar to Hen Harrier, and formerly considered conspecific (i.e. the same species). The expert review of disturbance presented by Ruddock and Whitfield (2007) suggests active disturbance events during the incubation (part of breeding) period for Hen Harrier are, in the view of the majority of experts, likely to occur at <10-500m from a nest.

Hen Harrier, whilst at the nest, are evaluated as potentially sensitive to disturbance from construction related activities (during the breeding season) at distances of 500m or less.

Whilst foraging

There have been no specific studies examining the flight initiation distance (FID) of Hen Harriers to human disturbance. However, 150m is the Minimum Approach Distance (MAD) (Livesey *et al.,* 2016) indicated for likely disturbance in respect of Falconiformes (the family of birds with characteristics most similar to Hen Harrier).

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A study on FIDs on Northern Harrier *Circus cyaneus hudsonius* from aircraft suggested a mean FID of 70m (Booms *et al.,* 2010) implying that birds may react to disturbance of similar magnitude (90db) at a distance of 105m. In a wider review of FIDs, Livesey *et al.* (2016) indicated a mean FIDs for Falconiformes of 89.7m (with a Minimum Approach Distance (MAD) 134.5m) (for pedestrian-based disturbance) and 79.7m (MAD 119.5m) (for motorized vehicles). However, birds will be habituated to certain background activities and react less to artificial noise versus the presence of humans.

Collectively, these data would conservatively suggest that the MAD indicated in Livesey *et al.,* 2016 is acceptable to assume for the current appraisal, and therefore it is concluded that foraging Hen Harrier are unlikely to be impacted by disturbance events over 150m away and within this distance only events of similar magnitude to the sources described (e.g. at 90dB) may have any effect. A 150m buffer of the proposed development is taken as the zone wherein effective habitat loss may take place following disturbance through noise or visual intrusion, should suitable foraging habitat be present within this radius of works which also overlaps the 2km core foraging range of any given nest location. Breeding Hen Harrier are evaluated as sensitive to disturbance within this distance (150m) from works – given the potential for secondary effects on breeding success.

8.6.1.4.3 Sensitivity of Roosting Hen Harrier

As a species that disperses widely during the winter from breeding sites (Watson, 1977), Hen Harrier are less restricted to specific foraging areas (i.e. non-breeding birds are not territorial) during the non-breeding season. As a consequence, foraging Hen Harrier are evaluated as less sensitive to disturbance at this time, as any individual encountering sources of disturbance will not be tied to a defined territory, and would have ample displacement habitat available within which to forage in the event of a brief disturbance event.

In relation to disturbance in proximity to winter roosting sites; birds are known to forage extensively from regularly used roosting sites (at least up to 24km see Watson, 1977) (compared to a 2km core range for nesting sites) and, in comparison to during the breeding season show little fidelity[21] both of which reduce sensitivity to disturbance related effects.

Windfarms and associated infrastructure have not been explicitly defined as a threat or pressure on roosts within the Irish context.

8.6.1.4.4 Positive Sensitivity towards habitat creation or sympathetic management

Hen Harriers are positively sensitive to the creation of or sympathetic management of foraging and nesting habitat within their traditional range (Forrest *et al.,* 2011). Multiple studies exist where Hen Harriers have continued to nest and forage in close proximity to operational wind energy developments where inclusive habitat 'enhancement' was provided (Forrest *et al.,* 2011; Robson, 2011 as cited in NPWS, (draft) 2017[22]).

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

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

The Slievefelim to Silvermines Mountains SPA was one of only two SPAs to record an increase in breeding territories between 2005 and 2015 (Ruddock *et al*., 2016). It also had the greatest proportional increase in population, with an estimated population of five pairs in the SPA in 2005 rising to a total of ten pairs being

[21] NPWS.2015. Hen Harrier Conservation and the Forestry Sector in Ireland.
[22] NPWS. 2017. *Hen Harrier Conservation and the Renewable Energy Sector in Ireland (Draft).*

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estimated in the SPA in 2015. Apart from the Slieve Bloom Mountains SPA, where the Hen Harrier population rose from five pairs in 2005 to 13 pairs in 2015, the remaining four SPAs designated for the conservation of Hen Harrier all showed reductions in the number of breeding territories recorded from 2005 to 2015 (Ruddock *et al.,* 2016).

Habitat use in the 2015 National Survey of Hen Harrier indicated that second rotation forestry was the most common nesting habitat selected followed by heather. Out of 108 confirmed nesting territories, 64 (59%) were in second rotation forestry with 28 nests (26%) of nests in heather. More scarcely used habitats included scrub (nine nests), first rotation forestry (six nests) and failed forest (one nest).

8.6.1.6 Receiving Environment (the Baseline + Trends)

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

"Forests less than 15 years old constitute to varying degrees a potential foraging resource for Hen Harriers. In line with the forecasted reduction in the extent of the forest nesting resource, indicative future estimates of the extent of the potential forest foraging resource within the SPA network shows an acute declining trend over the next 10 years[23]". This negative trend is also applicable to the Slieve Felim to Silvermines Mountains SPA.

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

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

8.6.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.6.2.1 Cumulative Evaluation Study Areas

8.6.2.1.1 UWF 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 Hen Harrier	**Justification for the Study Area Extents**
2km from the UWF Grid Connection construction works area boundary in all directions 4km from UWF Grid Connection construction works areas to identify Other Projects or Activities which could contribute to cumulative effects.	Cumulative impacts should be assessed at the relevant biogeographical scale, so that the assessment of the impact of the development can be made alone and in combination with other developments- SNH 2018[24] Little information is available on the effects of grid infrastructure construction activities on breeding Hen Harriers, although effects from large scale development such as wind farms at distances of up to 1km from nests has been reported (Ruddock & Whitfield, 2007, Wilson *et al.* ,2015). An area of twice this has been conservatively selected in line with Best Practice, (SNH, 2017). This area is considered conservative in the context of the proposed UWF Grid Connection, which may not have the same magnitude of source impacts during construction and/or operation as other larger developments cited in the references above. The study area is doubled to identify those Other Elements (or Other Projects or Activities) which may cause cumulative effects.

The study is illustrated on Figure CE 8.6 UWF Grid Connection Cumulative Evaluation Study Area for Hen Harrier.

8.6.2.1.2 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 8.6.2.2.1 below.

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

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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 8-47 and illustrated on Figure WP 8.6: Whole Project Study Area for Hen Harrier (Volume C3 EIAR Figures).

Table 8-47: Cumulative Evaluation Study Area for Hen Harrier

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	2km from the construction works/afforestation area boundaries in all directions for whole project effect; 4km from construction works areas to identify Other Projects or Activities which could contribute to cumulative effects.	As per SNH (2017) guidance Research on the spatial ecology of Hen Harriers has shown that foraging females spend most of their time within 1km of the nest, while males hunt mostly within 2km of the nest (Arroyo *et al.,* 2009, Irwin *et al.,* 2012, Arroyo *et al.,* 2014). The study area is doubled to identify those Other Elements (or Other Projects or Activities) which may cause cumulative effects.
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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

The evaluation of cumulative impacts to Hen Harrier also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects with either the UWF Grid Connection or with any of the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of these Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for Cumulative Evaluations (Section A2.1.4.8).

Milestone Windfarm (existing), Rear Cross Quarry (existing), Castlewaller Windfarm (consented windfarm and potential grid connection), and Bunkimalta Windfarm (potential windfarm and consented grid connection, and the activities: Forestry, Agriculture and Turf-Cutting (in the surrounding areas) have been scoped in for evaluation of cumulative effects to Hen Harrier.

8.6.2.2.1 Potential for Impacts to Hen Harrier

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Hen Harrier. The results of this evaluation are included in Table 8-48.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure WP 8.6. The baseline character of the areas around these Elements is described in Section 8.6.2.3.

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Table 8-48: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Included for the evaluation of cumulative effects
Element 4:	Included for the evaluation of cumulative effects

Upperchurch Windfarm (UWF)	
Element 5: UWF Other Activities	Included for the evaluation of cumulative effects (with the exception of Haul Route Activities HA 1 to HA20, which are evaluated as excluded as these activities do not have potential to act as a source for impacts on Hen Harriers due to their negligible magnitude in terms of source disturbance and location on public roads and have been scoped out accordingly).
Other Project or Activity	
Milestone Windfarm *(existing)* Rearcross Quarry *(existing)* Castlewaller Windfarm *(consented windfarm & potential grid connection)* Bunkimalta Windfarm *(potential windfarm, consented grid connection)* Forestry (in the surrounding area) Agriculture (in the surrounding area) Turf-Cutting (in the surrounding area)	Yes, included

8.6.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.6.2.3.1 Element 2: UWF Related Works

The location of the 5 No. different parts of UWF Related Works are outside of the SPA, except for one overlap to the north of Haul Route Works HW7 (however HW7 does not require works or vegetation clearance within the SPA boundary). See Figure WP 8.6.

Nesting Habitat within 2km of UWF Related Works

A desk-top assessment on habitat availability for nesting Hen Harriers within 2km of the UWF Related Works was undertaken from aerial photography interpretation. A ground-truthing exercise was then undertaken on these data to identify undetermined habitats and check a sample of the aerial photography interpretation.

A total of 5,455ha of lands were assessed within the 2km buffer of the UWF Related Works. Of this, 1,341 (24.6%) was considered to provide suitable nesting habitat for Hen Harrier, with 4,114ha (75.4%) classed as unsuitable.

Foraging Habitat

A similar exercise to the above was also undertaken to determine the extent of foraging habitat within 2km of the UWF Related Works. Habitats identified as suitable for foraging by Hen Harriers within 2km of UWF Related Works were all peatland habitats (including heath), freshwater marsh, wet grassland, mosaic grasslands (including those with rush cover and rough grazings), scrub, dense bracken, pre-thicket forestry (i.e. forests where there the canopy has not closed), clearfell, hedgerows and treelines. Habitats considered unsuitable for foraging included improved agricultural grasslands and dense (closed-canopy) woodland.

Out of the 5,455ha of lands that were evaluated, 2,050 (38%) was considered to provide suitable foraging habitat for Hen Harrier, with 3,405ha (62%) classed as unsuitable.

In addition, to look at the zone of potential disturbance to foraging Hen Harriers, all foraging habitats within 150m of the UWF Related Works (i.e. the Minimum Approach Distance for Hen Harriers) were also examined for their suitability for foraging Hen Harriers. Out of a total of 560ha, 152ha (27%) were classed as suitable foraging habitat for Hen Harrier with 408ha (73%) classed as unsuitable.

Roosting Habitat within 2km of UWF Related Works

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

Nearest Nesting and Roost Sites

For the current appraisal a further review of desktop information and consultation with local experts, and NPWS has been undertaken. No Hen Harrier nest locations/breeding sites are recorded within 1km of the UWF Related Works element, or within 1km of the consented Upperchurch Windfarm boundary. None are present within a further radius of 2km (the closest nesting attempt in 2019 was 4.8km from the boundary of the UWF Related Works).

The nearest known *historical* nest location to the UWF Related Works is that within the townland of Knockalough, located ca. 2.5 km to the south; no confirmed nest has occurred here in recent years (i.e. 2016-2019) and the last confirmed nesting attempt was in 2014. This nest is not included in Table 8.49.

Previously a nest has been located at Curreeny, to the northwest of UWF Related Works, and at Glenough Windfarm, to the south of UWF Related Works. The Curreeny nesting territory has not been confirmed active since 2014, was not active in 2019 and is also not included in Table 8.49. The Glenough nesting territory (adjacent to the operating Glenough Windfarm) has been active in recent years up to and including 2019. Due to separation distance from the proposed UWF Grid Connection, this nest has not been included in Table 8.49.

For the avoidance of doubt, Table 8-49 below outlines the distance in kilometers from all identified nests (2016-2019) to UWF Related Works (construction works boundary). For completeness all nests identified in Section 8.6.1.2.4) are included. Distances are also provided to the Upperchurch Windfarm (UWF) 2013 Study area and the nearest Consented UWF Turbine.

Table 8-49. Historical and Recently Active Hen Harrier Nests 2016-2019*

Nest	Within SPA	Last Confirmed as active	Distance to UWF Related Works (CWB) (km)	Distance to Upperchurch Windfarm 2013 Study Area (km)	Distance to nearest Consented UWF Turbine Location (km)
A	Yes	2016	15.8	16.9	17.1
B	Yes	2019	14.0	15.2	15.5
C	Yes	2019	12.9	13.9	14.1
D	Yes	2019	11.8	13.0	13.3
E	Yes	2019	10.5	11.8	12.1
F	Yes	2019	9.3	10.7	11.0
G1	Yes	2019	6.6	7.5	7.5
G2	Yes		6.5	7.4	7.4
G3	Yes		6.3	7.2	7.2
H1	Yes	2019	4.5	5.3	5.3
H2	Yes		4.8	5.3	5.4
I	Yes	2016	13.6	14.5	14.7
J	Yes	2017	12.7	13.4	13.7

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

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

For the period covered by the current evaluation (2016-2019 inclusive) the closest nest (H1) within the SPA to UWF Related Works is 4.5km to the west of the nearest point of construction works.

Winter Roosts within 2km of UWF Related Works

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

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

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

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

Connectivity to Designated Sites – Scottish Natural Heritage Guidance

Considering the SNH recommendation that it is the core range (2km) which should be used when determining connectivity, given the limited amount of foraging habitat available for Hen Harrier within 2km of UWF Related Works and, importantly, no known precedent for traditional usage by Hen Harrier, it is considered that nesting pairs within the SPA do not currently rely on hunting habitat within the consented Upperchurch Windfarm or within the construction works area boundaries of the UWF Related Works[25].

In the period since the submittion of the Appeal to An Bord Pleanala, surveys conducted in 2019 at the UWF Related Works site, in April and July, in line with Best Practice (SNH 2017) and overlapping periods of known peaks in Hen Harrier activity, recorded no flight activity by Hen Harrier within 500m of UWF Related Works. The new findings presented herein are not considered to conflict with evaluations previously presented in respect of UWF Related Works (PL92.303634).

8.6.2.3.2 Element 3: UWF Replacement Forestry

The UWF Replacement Forestry location comprises primarily improved agricultural grassland, which is of low attractiveness for foraging Hen Harrier. No breeding or winter roost habitat is present. The nearest nest to UWF Replacement Forestry is H1 at 6.8km distant.

The UWF Replacement Forestry is located outside of the SPA boundary. See Figure WP 8.6.

8.6.2.3.3 Element 4: Upperchurch Windfarm

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

The Upperchurch Windfarm is outside the Slievefelim to Silvermines Mountains SPA. With regard to the Upperchurch Windfarm, Hen Harrier were not recorded as breeding within the study area for the 2013 EIS and the habitat was evaluated as 'sub-optimal', see Figure WP 8.6.

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

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A desk-top assessment on habitat availability for nesting Hen Harriers within the 2013 Windfarm Study Area was undertaken from aerial photography interpretation in 2019. A total of 407ha of land were assessed. Of this, 127ha (31.2%) was considered to provide suitable nesting habitat for Hen Harrier.

In respect of foraging habitats, out of the total of 407ha of lands that were assessed (within the 2013 EIS study area), 95ha (23.3%) was considered to provide suitable foraging habitat for Hen Harrier. In addition to these habitats, a total of 10.6km of hedgerows and treelines were also identified which may offer foraging opportunities to Hen Harrier. The relatively low percentage of suitable foraging habitat is considered a limiting factor to this area attracting Hen Harrier and considered in line with the previous evaluation (2013) of the site as 'sub-optimal'.

Foraging at low frequency during the summer months has been described in the 2013 EIS. Similarly, habitats may be utilised for foraging during the winter months, however no suitable winter roost habitat is present.

Surveys in the interim period since consent, for both Upperchurch Windfarm (Ecopower Developments, 2015 & 2016) and the nearby consented Milestone windfarm (BES, 2015 & 2017) have also taken place.

The results of the Upperchurch Windfarm surveys (Ecopower Developments, 2015 & 2016) is that Hen Harrier observations have continued to remain low during the breeding season (April-July as cited in SNH Guidance) with only 6 observations, in total comprising 467 seconds, recorded during this period. Of this, only one bird was within the Consented Upperchurch Windfarm boundary – in March 2015 where a bird was recorded for 15 seconds.

Pre-construction surveys aimed at establishing any breeding activity at the nearby Milestone Windfarm (BES, 2015 & 2017) provide further insight into Hen Harrier usage of the area. Within 2015, these surveys took place in April, May and June of 2015; and in April and May of 2017. The methods followed were based on the methodology used in the Irish Hen Harrier Survey 2015 (Ruddock *et al*., 2016) to detect breeding territories (see 'Survey and recording guidelines for contributors' within the cited document) (see Appendix 8.6: Milestone & Inchivara Wind Farm Hen Harrier Survey 2015 2017). Results of pre-construction surveys at Milestone Windfarm yielded three observations of Hen Harriers across two yearly periods of the breeding season when expected activity would be high if Hen Harriers were breeding onsite (at Milestone) or locally.

Surveys were conducted in 2019 in April and July, by Inis Environmental Consultants, in line with Best Practice (SNH, 2017) utilising 10 vantage points, and overlapping periods of known peaks in Hen Harrier activity. With 3 observations, in total comprising 200 seconds, recorded during this period. Of these observations, two bouts of flight activity by Hen Harrier, in total comprising 44 seconds out of 120 hours of breeding season surveys, were within 500m of Consented UWF Turbine locations or within the 2013 wind farm study area (see Appendix 8.4: Hen Harrier Fieldwork & Survey Results).

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

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Previously a nest has been located at Curreeny, ca. 2.7km to the northwest of the consented Upperchurch Windfarm, and at Glenough Windfarm, ca.4km to the south of the consented Upperchurch Windfarm. The Curreeny nesting territory has not been confirmed active since 2014 (Inis Environmental Consultants, unpublished data) and was also inactive in 2019.

The Glenough nesting territory (adjacent to the operating Glenough Windfarm) has been active in recent years up to and including 2019. Upperchurch windfarm is outside the core range (2km) for this nest in respect of foraging.

Nests identified for the current study and their respective distance from Upperchurch Windfarm are presented in Table 8-49 (see above).

Consideration of the Passage of Time: The makeup of suitable habitat for Hen Harrier in the Upperchurch Windfarm site has not materially changed since 2012/2013, and the frequency of use by Hen Harrier, recorded during the 2012/2013 surveys, is supported by the results of the Upperchurch and Milestone surveys described in respect of recent years – in addition to survey results from 2019. By reason of distance from likely centres of activity for Hen Harrier (nearest confirmed nests), usage of the Upperchurch Windfarm site has continued to remain low and does not demonstrate any dependency by birds, breeding within the SPA, upon lands outside the SPA where the consented Upperchurch Windfarm is to be located. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this 2019 EIAR for UWF Grid Connection and are supported by findings from surveys conducted in the interim and in April and July of 2019.

8.6.2.3.4 Element 5: UWF Other Activities

The Upperchurch Hen Harrier Scheme is located outside the SPA in Knockcurraghbola Commons, Coumnageeha, Foilnaman, Knockmaroe and Grousehall townlands on agricultural lands between the Slievefelim to Silvermines SPA and the Upperchurch Windfarm, see Figure WP 8.6.

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

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

8.6.2.3.5 Other Projects or Activities

Milestone Windfarm is located outside the Slievefelim to Silvermines Mountain SPA, to the east of the 110kV UGC route in Knockcurraghbola Commons and Knockcurraghbola Crownlands, and is almost immediately south west of Upperchurch Windfarm/UWF Related Works construction works. Milestone Windfarm comprises 4 no. built and operational turbines and associated infrastructure. The implementation of a Hen Harrier Management Plan was conditioned as part of planning consent.

Rearcross Quarry: An operational quarry exists near Rear Cross in Shanballyedmond townland ca.1km to the south of the route of the 110kV UGC along the Regional Road R503. Rearcross Quarry is located within the Slievefelim to Silvermines Mountain SPA, and measures to protect hen harrier form part of the planning conditions and licences for this quarry.
Note: the supply of aggregate to the UWF Grid Connection and Other Elements of the Whole UWF Project will be supplied as part of the consented capacity of the Rearcross Quarry, and no expansion of the quarry is required in relation to this supply.

Castlewaller Windfarm is located within the Slievefelim to Silvermines Mountain SPA, with consented turbines located c.1.2km to the north of the UWF Grid Connection where the 110kV UGC is routed along the R503. This consented windfarm is located within areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts. As per planning

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conditions, Castlewaller Windfarm will be subject to significant management plans in respect of Hen Harrier. The grid connection for Castlewaller Windfarm is neither currently consented nor proposed, however a potential route (as per ABP correspondence) was identified along the local roads in Castlewaller townland (same road (L6009-0) as UWF Grid Connection), then crossing the R503 and heading south predominantly along public roads to Killonan Station, the potential grid connection also includes site access along an existing forestry road from an existing forestry entrance off the R503. It is assumed that hen harrier protective measures will for part of any future planning application for the grid connection / site access works.

Potential Bunkimalta Windfarm is also located within the Slievefelim to Silvermines Mountain SPA. Although it is not expected that UWF Grid Connection will be constructed during the same time as any future-proposed Bunkimalta Windfarm, a precautionary approach has been adopted in this EIAR, and a potential windfarm in the same geographical location as the previously proposed Bunkimalta Windfarm, is evaluate herein. Therefore, it is assumed, for the purposes of this report that the potential Bunkiamalta Windfarm will be located within the SPA, c.4.6km to the north of the UWF Grid Connection 110kV UGC route, and that this potential windfarm will be located within areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts. Due to its location within an SPA, it is assumed that the Bunkimalta Windfarm will only proceed where the windfarm can be developed without causing adverse effects to the Hen Harrier and will be subject to significant management plans in respect of Hen Harrier. In relation to the grid connection, this part of the windfarm is already consented and is routed to the north towards Nenagh town, predominantly along forestry roads and public roads. Consented works also include site entrance works at forestry entrances.

Forestry in the surrounding area is widespread throughout the study area and occurs outside and inside the boundary of the SPA. Approximately half of the SPA is afforested, including both first and second rotation plantations and clear fell areas and forestry is consequently listed as one of the most important activities with high effect on the SPA (High negative rank). General forestry activities in commercial conifer plantations in the surrounding area, includes management of growing forests, along with planting, thinning and harvesting activities.

Agriculture in the surrounding area is widespread throughout the study area and predominately comprises hill farming with more intensive grassland farming occurring at lower altitudes. Hill farming constitutes roughly one half of the land use within the SPA and is mainly based on the usage of rough grassland. Grazing is a medium ranked activity both in terms of negative and positive impacts on the SPA.

Turf-Cutting or Peat Extraction, both mechanically and by hand occurs, with cut-over bog evident at a number of locations within the study area, including at Bleanbeg Bog, Cummermore, Gortmahonoge and at Cummer (Mulloghney). Turf-Cutting is also a medium ranked negative pressure on the SPA.

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8.6.3 PROJECT DESIGN MEASURES for Hen Harrier

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

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

The Project Design Measures outlined in Table 8-50 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Hen Harrier**.

Table 8-50: UWF Grid Connection Project Design Measures relevant to Hen Harrier

PD ID	**Project Design Environmental Protection Measure (PD)**
PD01	UWF Grid Connection construction works during the Hen Harrier breeding season (March to August inclusive) will only take place at the Mountphilips Substation Site; construction of the 110kV UGC between the Mountphilips Substation site and the Consented UWF Substation compound will be carried out during the months of September to February inclusive.
PD02	If works at Mountphilips Substation site are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory Hen Harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the entire construction works area boundary. These surveys will be completed prior to the start-up of all construction activities. No works will take place within 2 km of any identified active Hen Harrier nest during the hen harrier breeding season.
PD03	Although no hen harrier roosts are currently known to occur within 1km of UWF Grid Connection, confirmatory surveys will be completed to record any roosting locations within 1km of UWF Grid Connection. Should a hen harrier roost occur within 1km of UWF Grid Connection works, then construction works within 1km of a roost will be limited to the period between 'one hour after sunrise' to 'one hour before sunset' during the Hen Harrier roosting season (October to February inclusive).
PD58	Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season i.e. not during the period of March to August inclusive. This includes hedgerow and scrub removal in addition to hedgerow trimming.
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).
PD07	110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads.
PD11	Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m.

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

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

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8.6.4 EVALUATION OF IMPACTS to Hen Harrier

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

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

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

Table 8-51: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat (construction/operational stages)	*Reduction in or Loss of Suitable Nesting Habitat or Winter Roosting Habitat (construction stage)*
Disturbance/Displacement of foraging Hen Harrier, during the breeding season (construction stage))	*Mortality of Hen Harrier in or at Nest Sites or Roost Sites, (construction stage)*
Disturbance/Displacement of foraging Hen Harrier outside the breeding season (construction stage)	*Disturbance/Displacement of Nesting or Roosting Hen Harrier (construction stage)*
Reduction in Prey Item Species (construction/operational stage)	*Additive mortality (operational stage)*
	Disturbance/displacement to nesting or roosting Hen Harrier (operational stage)
	Disturbance/displacement to foraging Hen Harrier (breeding and non-breeding) (operational stage)
	Disturbance/displacement (decommissioning stage)

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Tables in the **following Sections 8.6.4.1 to 8.6.4.4**.

The source-pathway-receptor links and the rationale for impacts excluded are described in the section directly after the Impact Evaluation Tables in Section 8.6.4.5.

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

Impact Description	
Project Life Cycle Stage:	Construction/Operational stage

Impact Source: Land cover change, vegetation clearance; earthworks

Cumulative Impact Source: Land cover change, forestry felling, removal of hedgerows, Land cover change from Agricultural Practices such as drainage, Direct habitat loss through peat extraction of intact bog, and habitat loss through forest maturation.

Impact Pathway: Land cover

Impact Description: Hen Harrier is a very high sensitivity receptor of International Importance. Permanent Land take or land use/cover change of positively selected foraging habitats (i.e. suitable and within the established core range for connectivity to a nest) during the construction stage may cause secondary effects for this Annex I species and SPA special conservation interest. Studies have shown that most foraging takes place within 2km of the nest site, and as per SNH Guidance this is considered the core foraging range for Hen Harrier. The magnitude of effects is distance (to nearest nest) dependant, as the area within a certain radius of the nest increases as the square of this distance, for example hunting concentration becomes 10 times less between 2km and 5km from the nest compared to within 2km of the nest (Irwin *et al.,* 2012).

Although home range size may vary between locations and across individuals, it is clear from studies that Harrier females during the breeding season hunt closer to nests than males (e.g. Arroyo et al., 2006[26]); home ranges of females are centred on nest sites and on average may be half the area of that of males. In a Scottish study (Arroyo et al. 2014[27]) female harriers mostly hunted within 1km of nests.

Male birds have larger home ranges (Arroyo *et al.* 2006, 2014), but studies also suggest that male harriers mostly hunt within 2km of the nest (Arroyo et al.,2014), but can hunt further away (out to 10km (SNH,2016)). In a study of Northern Harrier, Martin 1987, found that 85% of all male activity occurred within 3km of the nest. Furthermore, studies have shown that the amount of time spent foraging by Hen Harrier (expressed in min/km^2) decreases with distance from the nest (Madders (2003)).

Of particular importance and where pathways for likely significant effects are more likely are lands which provide high quality foraging habitat within 2km of nests and on which breeding Hen Harrier (male or female birds) may be dependent during key periods of the breeding cycle such as provisioning young. Loss of suitable habitat may affect breeding success/productivity for one whole cycle, or until vegetation is re-instated both when considered alone and in combination with other possible sources of loss. Loss of high dependency foraging habitat, where it occurs in close proximity to nesting locations, at key periods of the breeding cycle may result in reduced productivity and/or nest success, in particular where it occurs within 2km of a nest location ***and*** where limited alternative habitat is available. The degree of existing foraging habitat within the core foraging range is relevant in determining the dependency/reliance on any suitable habitat outside of this range, and consequently on the significance of any loss.

The creation of, or sympathetic management of, foraging and nesting habitat within the traditional range of breeding hen harrier positively affect nest success (Forrest *et al.,* 2011)**.**

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

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[26] Arroyo, B., Leckie, F., Redpath, S. (2006) Habitat Use and Range Management on Priority Areas for Hen Harriers:Final Report. Report to Scottish Natural Heritage. First draft- March 2006.

[27] Arroyo, B., Leckie, F., Amar, A., McCluskie, A. & Redpath, S. (2014) Ranging behaviour of Hen Harriers breeding in Special Protection Areas in Scotland. Bird Study 61: 48-55.

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

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
There will be no temporary loss of suitable foraging habitat as a result of the construction of UWF Grid Connection.

Permanent land cover change will only occur at the Mountphilips Substation site in Coole and Mountphilips townlands. All works for UWF Grid Connection outside of the Mountphilips Substation site (i.e. the 110kV UGC) will take place on paved roadways where there is no potential for any temporary or permanent, suitable habitat loss.

The amount of suitable habitat loss at the Mountphilips Substation site relates to a very small area (0.05ha or $^1/_7{}^{th}$ of an acre) of wet grassland (GS4) which will permanently change to new access road. This area of suitable habitat is located in the 2nd field between the site entrance and the substation compound. As the nearest nest (Nest Site A) is 4.6km from this suitable habitat at the Mountphilips Substation site, this habitat is considered to be sub-optimal based on distance from nest, within the context of the species preference for nest site fidelity and the available habitat within the core foraging range.

Foraging habitat surveys have shown that c. 33% of lands within 2km of Nest A comprise suitable foraging habitat (420ha at minimum plus 77km of linear features), supporting the assertion that there will be no reliance by nesting birds on the suitable habitat at the Mountphilips Substation site, based on habitat availability closer to the Nest A location. Therefore, the magnitude of foraging habitat loss is evaluated as Negligible.

In addition it is considered that whilst male harriers can occur and forage at distances greater than 3km from a nest, given the project design measures as part of the project, that the probability of foraging birds occurring at this isolated location (in the context of the nearby SPA and available habitat therein), and at frequencies sufficiently high to result in significant consequences on breeding, is very low.

As part of the design of the Mountphilips Substation site, 700m of new hedgerow, comprising a mix of native tree species, will be planted along each side of the new permanent access road during the construction stage, and will provide permanent suitable foraging habitat in the form of new linear features at the Mountphilips Substation site. However, due to the separation distance from the nearest nest, the magnitude of this positive impact will also be Negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier, and Negligible magnitude of foraging habitat loss;
- Long term (permanent) duration, and low reversibility;
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success, and;
- the separation distance of >4.5km from landcover change to nearest known nest (Nest Site A) within the study period;
- Studies have shown that most foraging occurs within 2km of a nest and reduces thereafter with distance;
- The very small extent of suitable habitat which will be lost – 0.05ha;
- The scale and availability of suitable foraging habitat within 2km of Nest Site A, and the distance to Mountphilips;
- The magnitude of effect, on the sensitive aspect Hen Harrier, following Percival *et al*. is evaluated as 'Negligible' (0-1% of habitat lost), equivalent to a non-distinguishable change away from baseline conditions, and;
- The provision of 700m of new hedgerow along the new access road, will provide new permanent linear habitat in the longer term for hen harrier.

Sensitive Aspect: **Hen Harrier**

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:
The loss of foraging habitat only relates to the Mountphilips Substation, which has been evaluated as being of Negligible magnitude and sub-optimal due to the separation distance (4.6km) from the nearest hen harrier nest (Nest Site A). Habitat surveys at Nest Site A also demonstrate that there is sufficient foraging habitat (at least 33%) within 2km of this nest, and therefore it is evaluated that there would be no reliance on the suitable habitat at Mountphilips. In addition it is considered that whilst male harriers may occur and forage at distances greater than 3km from a nest, given the project design measures as part of the project, that the probability of foraging birds occurring at this isolated location (in the context of the nearby SPA and available habitat therein), and at frequencies sufficiently high to result in significant consequences on breeding, is very low.

Due to the above, it is evaluated that there is no potential for the Mountphilips Substation site to cumulatively affect Nest Site A in combination with consented Castlewaller Windfarm, potential Bunkimalta Windfarm, Forestry Activities (in the surrounding area), Turf Cutting or Agricultural Activities. In addition, the hen harrier management plans for the windfarm sites will result in Neutral impacts from these projects. Impacts from agriculture and forestry in areas surrounding Mountphilips itself are evaluated as negligible.

It is also considered that the potential for synergistic effects on other nesting territories such as for example if birds from the nearest nest (in this case nest A) were forced to rely on lands elsewhere, resulting in intraspecific competition are avoided due to separation distance, and thus effects on other nests identified are similarly excluded.

In respect of the potential Castlewaller Windfarm grid connection, part of the potential underground cable route is located within 2km of the identified Nest A and Nest C. Any land cover change of natural habitats associated with this potential development within 2km of a Hen Harrier is not likely to result in the selection (by Hen Harrier) of lands at Mountphilips for compensatory foraging due to distance, and in combination effects are excluded on this basis.

Due to the separation distance between the Mountphilips Substation site and the Other Elements of the Whole UWF Project, Existing Rear Cross Quarry or Existing Milestone Windfarm, it is considered that no cumulative effects will occur.

There is no potential for cumulative impacts of the 110kV UGC where it is routed through the UWF Related Works/Upperchurch Windfarm area because the route of UWF Grid Connection 110kV UGC is entirely on paved roads (with no foraging habitat loss) within the overlap zone and therefore the UWF Grid Connection 110kV UGC will not cause any loss of habitat and cannot contribute to cumulative impacts. Cumulative impacts with forestry or agriculture, similarly cannot occur with the 110kV UGC works as there is no foraging habitat loss associated with 110kV UGC in the first instance.

No secondary habitat loss will occur in respect of existing Rear Cross quarrying operations which will provide materials for the development, as aggregate for the UWF Grid Connection and the Other Elements will be supplied within the consented capacity of the quarry.

Significance of the Impact: Not Significant

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- Rationale for Impact Evaluation:
- Very High sensitivity rating for Hen Harrier, and Negligible magnitude of foraging habitat loss;
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success, and;
- the separation distance of >4.5km from landcover change to nearest known nest (Nest Site A) within the study period, and;
- the loss of suitable foraging habitat at Mountphilips is of too small a scale and too far from the nearest nest (or any other nest) to cause cumulative impacts with other projects or activities in the area.
- Studies have shown that most foraging occurs within 2km of a nest and reduces thereafter with distance;

- No loss of foraging habitat associated with UWF Grid Connection (110kV UGC) where the cumulative evaluation study area overlaps the construction works areas for UWF Related Works and Upperchurch Windfarm.

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

Element 2: UWF Related Works

Impact Magnitude:

Total permanent land take of suitable foraging habitat is confined to improved agricultural grassland (0.12Ha); Wet Grassland (0.07Ha), upland blanket bog/Conifer mosaic (0.01Ha), Mature or closed canopy conifer plantation (0.28Ha) and scrub (0.004Ha) and totals 0.48Ha. None of this 0.48ha of suitable foraging habitat is within 2km (i.e. the core range) of an identified nest- in fact the nearest is Nest Site H1 at 4.5km to the west.

Foraging habitat surveys of the 2km core foraging habitat area around Nest Site H1 demonstrate that there is at minimum 51% suitable foraging habitat within 2km of the nest (644Ha of suitable foraging habitat and ca.24km of linear features), and it is evaluated that there will be no reliance by foraging Hen Harrier on suitable habitat therefore at the UWF Related Works site. There is a Very low probability therefore of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success, and;

Temporary habitat loss relates to up to 4.6km of internal cabling located in agricultural lands and 2.1km located in forestry lands, in addition to c.1500m of temporary access roads at 4 no. differing locations; all of which will occur outside the Hen Harrier breeding season as Project Design. All these lands will be available for foraging within one growing season once vegetation has re-established. All temporarily removed sections of field boundary will be re-instated following the completion of works in any area, with at least 3 year old native species. In addition, a net gain of ca.370m of new hedgerow will be planted at the UWF Related Works site. This will comprise locally sourced native species.

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

Overall the magnitude of foraging loss as a result of the development of UWF Related Works is evaluated as Negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The very high sensitivity rating of the species (context), and negligible magnitude;
- The small extent of permanent habitat loss, evaluated as a very slight change from baseline condition, and;
- The long-term duration of permanent habitat loss, however;
- The reversibility of temporary habitat loss is expected within the temporary-short term period, also;
- The nearest active Hen Harrier nests are at least 4.5km from works, and foraging habitat surveys demonstrate that at this distance there will be no reliance by nesting Hen Harrier on the foraging habitat at UWF Related Works;
- The reversibility of the impact with the reinstatement of lands at temporary works locations.
- Based on distance to nest H1 , Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success;

Element 3: UWF Replacement Forestry

Impact Magnitude:

Available foraging habitat for Hen Harrier currently within the land folio boundary comprises improved agricultural grassland (3.54Ha); Wet Grassland (0.44Ha) and Scrub (0.01Ha); in total 3.99Ha. This entire area will undergo landuse change to UWF Replacement Forestry (deciduous forestry) to be managed specifically for the

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use of Hen Harrier, including the incorporation of 'tried and tested' management measures which will facilitate Hen Harrier foraging and usage such as the provision of ride lines and clearings within the new woodland.

Although the nearest nest site to UWF Replacement Forestry is 6.8km to the west (Nest Site H1), which has >50% suitable habitat available for foraging within 2km of the nest (636Ha plus ca.23km of linear features), the location of the UWF Replacement Forestry adjacent to Upperchurch Hen Harrier Scheme areas, will increase the availability of suitable foraging habitat for Hen Harrier outside but proximal to the SPA, and therefore the magnitude of this positive impact is evaluated as Medium.

Significance of the Impact: Very Significant (positive)

Rationale for Impact Evaluation:

- The very high sensitivity rating of the species, and the demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The small extent of lands to be managed for Hen Harrier, and;
- The permanent duration, and;
- The Non-reversibility with the new woodland being a permanent woodland, which will not be harvested.

Element 4: Upperchurch Windfarm

Impact Magnitude: As per the 2013 RFI the magnitude of foraging habitat loss was calculated as 95Ha (actual loss plus effective loss through displacement effects). For completeness, given that the estimate of total displacement was based on 2017 as the construction year, an upwardly revised total estimate of **100.22** Ha has been extrapolated from data provided in the Upperchurch Windfarm RFI (Table 2 of the UWF Ecological Management Plan). This figure corresponds with 2020/2021 as the construction year – however it is still less than the 128Ha of lands to be provided/managed as additional favourable foraging areas under the conditioned Upperchurch Hen Harrier Scheme (evaluated other 'UWF Other Activities').

Significance of the Impact: Neutral Residual Impact

Rationale for Impact Evaluation:

- The effective loss of 100.22Ha of habitat constitutes an effect of medium magnitude (5-20% of available habitat lost);
- The implementation of the Upperchurch Hen Harrier Scheme, as conditioned;
- Very High sensitivity of the species, and;
- Long term duration.

Element 5: UWF Other Activities

Impact Magnitude: Neither Haul Route Activities nor Monitoring Activities nor Overhead Line Activities will not result in any loss of foraging habitat.
In total 128ha of habitat will be managed to increase the area of Hen Harrier foraging habitat, measures set down in the Upperchurch Hen Harrier Scheme to achieve this include:

Rush management to control coverage and increase suitability for foraging habitat, promoting prey item species;

2,085m increase in hedgerow, resulting in increased edge habitat for foraging and prey items;

3ha enclosures of native scrub and trees, increased cover for prey item species;

Lines of electric fence with plastic fliers so that they are more visible to the Hen Harrier, to avoid mortality;

Enhancement of the riparian corridor (to maintain corridor value for foraging Hen Harrier): 1220m of woody scrub species; and Erect fencing to make stockproof and exclude access to river by livestock.

The following restrictions will apply to landowners within the Upperchurch Hen harrier Habitat scheme (to maintain habitat suitability): Limited spreading of fertiliser (every 4-5 years); Limited spreading of lime (every 4-5 years); No burning; No excavation of drains or reclaiming heath or bog.

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

In total 128Ha of agricultural lands will be managed for the benefit of Hen Harrier, outside the turbine 250m buffer and the footprint of the development; as per the Upperchurch Windfarm EMP. The net gain to Hen Harrier is 128Ha-100.22Ha which is 27.8Ha. The magnitude of this gain is evaluated as High as it constitutes a major alteration to the baseline features present.

Significance of the Impact: Very significant (positive)

Rationale for Impact Evaluation:

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Existing Milestone Windfarm

Impact Magnitude: Effective Habitat Loss of Hen Harrier habitat occurs were suitable habitat is present within 250m of each existing turbine (n=4) location. However, an area of lands at Knockcurraghbola Commons will be managed as part of a Hen Harrier Management Area for the lifetime of the windfarm for the benefit of Hen Harrier- comprising 10.8ha. This includes rush management, nutrient management, weed control, and the maintenance of edge habitat.

Significance of the Impact: Neutral residual effect

Rationale for Impact Evaluation:

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

Other Project: Rear Cross Quarry

Impact Magnitude:
The already existing quarrying operation at Shanballyedmond, near Rear Cross covers approximately 10 ha and is located within the Slievefelim to Silvermines Mountains SPA. No additional habitat loss (beyond that consented) is predicted in respect of existing quarrying operations. As confirmed with the quarry owner, all aggregate will be supplied within the current consented capacity of the quarry.

Significance of the Impact: Neutral

Rationale for Impact Evaluation:

- the effective habitat loss is exactly equivalent to the area to be managed for the benefit of Hen Harrier, over the lifetime of the quarry.
- Although within the SPA, there no known expansion plans and the volumes of aggregate required for the Whole UWF Project will be supplied within the current consented capacity of the quarry.

Other Project: Castlewaller Windfarm *(consented windfarm, potential grid connection)*
Although Castlewaller Windfarm is not expected to be constructed during the same period as the UWF Grid Connection, it is nonetheless included for evaluation of cumulative effects on a precautionary basis.

Impact Magnitude: Effective Habitat Loss of Hen Harrier habitat will occur within 250m of each turbine location, where harriers use second rotation aged 3-9 years-estimated at 47.9Ha.[28] However, as conditioned under the windfarms planning permission, 47.9Ha of clear felled woodland will be managed for the lifetime of the windfarm for the benefit of Hen Harrier.The potential grid connection is routed along forestry/windfarm roads and public roads where it occurs within the SPA. It is assumed that any future proposal for the grid connection will include protection measures for Hen Harrier which will ensure significant impacts to Hen Harrier are avoided.

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

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Significance of the Impact: Neutral residual effect

Rationale for Impact Evaluation:
- The impact is evaluated as neutral given the effective habitat loss is exactly equivalent to the area of clear felled woodland to be managed for the benefit of Hen Harrier, over the lifetime of the wind farm.
- The assumption that hen harrier protection measures will be implemented as part of any future proposed grid connection, in the context of the route of the potential grid connection predominately along forestry and public roads.

Other Project: Potential Bunkimalta Windfarm *potential windfarm, consented grid connection)*
Although Bunkimalta Windfarm is not expected to be constructed during the same period as the UWF Grid Connection, it is nonetheless included for evaluation of cumulative effects on a precautionary basis

Impact Magnitude:
The consented grid connection is routed along forestry roads and public roads where it occurs within the SPA. It is assumed that any future proposed Bunkimalta Windfarm will include site design and mitigation measures to ensure that effects to Hen Harrier will not be significant (in the context of its location within a Hen Harrier SPA), this is likely to include measures in relation to land-use change, in particular the permanent exclusion of Hen Harrier from suitable habitat.

Significance of the Impact: Neutral residual effect

Rationale for Impact Evaluation:
- Requirement on projects within a designated site to prove that no significant adverse effects will occur.

Activity: Forestry Activities in the Surrounding Area

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

The following is cited directly from the document titled "Hen Harrier Conservation and the Forestry Sector in Ireland", published by NPWS in 2015:
"Forests less than 15 years old constitute to varying degrees a potential foraging resource for Hen Harriers. In line with the forecasted reduction in the extent of the forest nesting resource, indicative future estimates of the extent of the potential national *forest foraging* resource within the SPA network shows an acute declining trend over the next 10 years[29]"(emphasis added). This negative trend is also applicable to the Slieve Felim to Silvermines Mountains SPA, where the extent of useable forest is predicted to drop from 23% in 2012 to 11% in 2025.
It is likely that some sites within the 'wider countryside' areas supporting breeding Hen Harrier that have been afforested will also experience forestry related changes both due to the maturation of existing forest habitat and the conversion of currently useful habitat (e.g. scrub, low intensity managed farmland) to a less stable state.

Significance of the Impact: Significant (negative)

Rationale for Impact Evaluation:
- precautionary basis

Activity: Agricultural Activities in the Surrounding Area

Impact Magnitude:
Trends specific to the receiving environment are generally unavailable however agricultural activities have the potential to adversely affect the availability of Hen Harrier foraging habitat, through a number of pathways specifically agricultural practices which result in habitat loss, habitat fragmentation and habitat degradation due to intensification or abandonment. Grazing is a means of maintaining open habitats for Hen Harrier and changes to grazing regimes can alter the availability of suitable habitat. An EIP (European Innovation Partnership) Locally Led Scheme called the Hen Harrier Project is in place across 6 SPA's in Ireland including the Slievefelim to

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

Silvermine Mountains SPA which facilitates the reward of farmers whose land holding is within or adjacent to the SPA for maintaining suitable Hen Harrier habitat.

Significance of the Impact: Significant (negative)

Rationale for Impact Evaluation:

- Precautionary Basis - In the absence of available information on trends

Other Project: Turf-cutting

Impact Magnitude: Turf extraction appears to form part of the current baseline environment at various locations such as Bleanbeg Bog, Cummermore, Gortmahonoge and at Cummer (Mulloghney). Some of these habitats where they overlap the SPA are further protected through the provision of NHA's such as at Bleanbeg Bog, Mauherslieve Bog, and Grageen Fen and Bog, wherein further turf cutting of intact areas is unlawful, or SAC's such as Keeper Hill SAC, Bolingbrook Hill SAC, Silvermine Mountains SAC or Silvermines Mountains West SAC wherein Conservation Objectives to protect Qualifying Interest bog habitats are set out. Peat extraction by hand or through mechanical means is ranked as a medium level pressure in respect of Hen Harrier within the SPA[30].

Significance of the Impact: Neutral

Rationale for Impact Evaluation:

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

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

Whole UWF Project Effect

Magnitude:

Both positive and negative quality effects occur with regard to Hen Harrier foraging habitat loss across the Whole UWF Project.

Negative effects which stem from the UWF Grid Connection refer to permanent landcover change of 0.05Ha of suitable foraging habitat (GS4) at the Mountphilips Substation site; and 0.07ha of permanent landcover change of suitable habitat at the UWF Related Works site. The affected habitat at both sites is considered sub-optimal due to the separation distance to the nearest Hen Harrier nest (4.6km and 4.5km respectively). Foraging habitat surveys at nearest nests demonstrate that there is sufficient foraging habitat available to Hen Harrier within the core 2km foraging range of each (34% at Nest A and 51% at Nest H1), and it is considered that there is no reliance on lands at either the Mountphilips Substation site or UWF Related Works sites. Overall the magnitude of negative habitat loss is considered to be Negligible. The provision of 700m of new hedgerow at the Mountphilips Substation site for UWF Grid Connection and 370m of new linear habitat at the UWF Related Works site will provide new linear foraging habitat for Hen Harrier, albeit outside of the core foraging range from the nearest nests.

The negative effects of Upperchurch Windfarm, which is evaluated herein within the context of effective displacement based on a revised construction date of 2020/2021 (as per the Upperchurch Windfarm RFI 2013); is effectively mitigated by the activities consented under the Upperchurch Hen Harrier Scheme (UWF Other Activities), which as intended results in a net gain through design to Hen Harrier both in area and quality of habitat. The provision and management of UWF Replacement Forestry (4ha) specifically for Hen Harrier, outside but proximal to the SPA and adjacent to the Upperchurch Hen Harrier Scheme also contributes to an overall net gain to Hen Harrier of an additional 31.8Ha of actively managed foraging habitat (net gain to Hen Harrier due to Hen Harrier Scheme is 128Ha-100.22Ha which is 27.8Ha, and the additional 4ha due to the UWF Replacement Forestry, giving a total net gain of 31.8Ha).

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

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Significance of the Whole Project Effect: Significant (positive)

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier;
- The demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The extent of lands to be managed for Hen Harrier overall (128Ha+4Ha=132ha), and;
- The long term to permanent duration, given that UWF Replacement Forestry will be a permanent woodland and will not be harvested, and;
- The negligible magnitude of habitat loss from the UWF Grid Connection Mountphilips Substation site which is located outside of the core foraging range of the nearest nest (4.6km) and also the absence of any habitat loss effects from the UWF Grid Connection 110kV route;
- The negligible magnitude of habitat loss from the UWF Related Works site which is located outside of the core foraging range of the nearest nest (4.5km);
- The reversibility of negative effects with reinstatement of lands, provision of new hedgerow, planting of a new permanent woodland and the application of the Upperchurch Hen Harrier Scheme and other measures as described.

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

The magnitude of foraging habitat loss resulting from the Whole UWF Project, consented Castlewaller Wind Farm, potential Bunkimalta Windfarm, existing Milestone Windfarm, Agriculture and turf cutting in the vicinity are evaluated as largely neutral. Forestry activities in the surrounding area are generally a negative trend in the background environment currently with declines in available foraging habitat in the short-medium term (next 10 years & expected to increase subsequently and evaluated as significant in that regard. Effects from Hen Harrier management plans in respect of consented Castlewaller, potential Bunkimalta and existing Milestone Windfarms will neutralise the effects of these windfarms and it is assumed that the potential Castlewaller grid connection will not result in land cover change likely to result in adverse affects on breeding Hen Harrier territories which it potentially overlaps. There will be a net gain from the Whole UWF Project which is at minimum 31.8Ha. Overall the magnitude is Low.

Significance of the Cumulative Impact: Neutral

Rationale for Cumulative Impact Evaluation:

- Very High sensitivity rating for Hen Harrier;
- The net gain in terms of lands managed specifically for the use of Hen Harrier, and;
- Extent of lands to be managed in total, notwithstanding,
- The medium-term duration of negative trend in respect of reductions in forestry based foraging habitat.
- Seperation distances to identified nests, with all locations of habitat loss or reduction located outside the core foraging range of hen harrier (i.e. >2km).

Topic: **Biodiversity**

8.6.4.2 Impact Evaluation Table: Disturbance/Displacement of foraging Hen Harrier during the breeding season

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: noise and visual intrusion; operating machinery; presence of construction personnel (at Mountphliips Substation site only)

Cumulative Impact Source: noise and visual intrusion; operating machinery; presence of construction personnel associated with Upperchurch Windfarm and UWF Replacement Forestry and UWF Other Activities, and associated with farming and forestry management activities, turf-cutting, quarrying works and potentially other windfarm construction sites.

Impact Pathway: Air, Visibility

Impact Description:

Breeding Hen Harriers are known to be sensitive to disturbance at or near the nest (Ruddock & Whitfield, 2007). Although estimates of disturbance distances between source and nest differ, a review by Ruddock & Whitfield (2007) suggests a conservative distance of effect of 1,000m, up to which, birds at the nest could be disturbed during wind farm construction activities.

Disturbance to foraging birds away from the immediate vicinity of nests may also occur (Masden, 2010; Pearce-Higgins *et al*., 2012). This can impair foraging success during critical periods of the breeding season such as when provisioning young or result in increased energy expenditure and subsequent reductions in fitness. This may be dependent on whether or not sequential effects occur, levels of habituation to background disturbance or whether sufficient displacement habitat is available once a bird experiences a disturbance event. The degree or frequency of baseline foraging is an influencing factor, as is distance to nests as this is a likely determinant of dependency.

A minimum approach distance (MAD) as a function of flight initiation distance (FID) is used to determine the likelihood of any effect on an individual. There have been no specific studies examining the FID of foraging Hen Harriers to human disturbance. However, a study on FIDs on Northern Harrier *Circus cyaneus* from aircraft suggested a mean FID of 70m (Booms *et al.,* 2010) implying that birds may react to disturbance of similar magnitude (90db) at a distance of 105m. In a wider review of FIDs, Livesey *et al*. (2016) indicated a mean FIDs for Falconiformes of 89.7m (MAD 134.5m) (for pedestrian-based disturbance) and 79.7m (MAD 119.5m) (for motorised vehicles). Collectively, these data would suggest that foraging Hen Harriers are unlikely to be impacted by disturbance events over 150m away. Hen Harrier will also be habituated to certain background activities such as traffic and machinery on roads and on farmlands and would be expected to react less to artificial noise than to the presence of humans.

Therefore, a 150m buffer of the proposed development is taken as the zone wherein effective habitat loss may take place following disturbance through noise or visual intrusion as a result of construction works and/or the presence of construction personnel. At distances further than 150m from construction works areas, noise or visual intrusion are unlikely to result in any noticeable effect on foraging Hen Harriers.

The magnitude of the disturbance/displacement effect is related to the likelihood of Hen Harrier being present within the 150m zone of potential impact, and therefore the availability of suitable foraging habitat and the distance of sources of disturbance/displacement to any given nest location is relevant.

The core foraging range for Hen Harrier is considered to be 2km from nests (Arroyo *et al.*, 2014; SNH, 2017). Although home range size may vary between locations and across individuals, it is clear from studies that Harrier

Hen Harrier
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females during the breeding season hunt closer to nests than males (e.g. Arroyo et al., 2006[31]); home ranges of females are centred on nest sites and on average may be half the area of that of males. In a Scottish study (Arroyo et al. 2014[32]) female harriers mostly hunted within 1km of nests.

Male birds have larger home ranges (Arroyo *et al.* 2006, 2014), but studies also suggest that male harriers mostly hunt within 2km of the nest (Arroyo et al.,2014), but can hunt further away (out to 10km (SNH,2016)). In a study of Northern Harrier, Martin 1987, found that 85% of all male activity occurred within 3km of the nest. Furthermore, studies have shown that the amount of time spent foragIng by Hen Harrier (expressed in min/km^2) decreases with distance from the nest (Madders (2003)). In this context it is considered that whilst male harriers may can occur and forage at distances greater than 4km from a nest, the likelihood of any dependence on (and by inference high frequency of occurrence at) locations where disturbance sources may occur during the breeding season, greater than 4km from a nest, such as present for example at Mountphilips Substation site, is extremely low.

In relation to cumulative (sequential) effects, multiple sources of noise and visual intrusion occurring within the same spatial and/or temporal timeframe may combine should Hen Harriers encounter multiple sources of disturbance displacement in succession.

To avoid any impacts to breeding hen harrier, UWF Grid Connection construction works during the Hen Harrier breeding season (March to August inclusive) will only take place at the Mountphilips Substation Site; construction of the 110kV UGC between the Mountphilips Substation site and the Consented UWF Substation compound will be carried out during the months of September to February inclusive (PD01). Additionally, if works at Mountphilips Substation site are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory Hen Harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the entire construction works area boundary. These surveys will be completed prior to the start-up of all construction activities. No works will take place within 2 km of any identified active Hen Harrier nest during the hen harrier breeding season (PD02). These two project design measures will ensure that disturbance/displacement of foraging Hen Harrier is avoided.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Disturbance/Displacement of foraging Hen Harrier during the breeding season

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
During the breeding season, no works will be carried out within the SPA, and UWF Grid Connection works will be limited to the Mountphilips Substation site. No works will be carried out on the 110kV UGC outside of the Mountphilips Substation site during the breeding season. . This means that all works during the breeding season, which will be limited to the Mountphilips Substation site, will take place at distances greater than 4.3km from any traditional nest sites which were recorded during the 2016, 2017 and 2019 breeding surveys.

Habitat surveys of lands within 2km of the known nest sites (2km is considered to be the core foraging area) demonstrate that there is ample suitable foraging habitat, which amounts to 3,580ha (or 42.9%) of the total land area (8,343ha) within the core foraging area around the 10 nests recorded in the upland area over the 2016 to 2019 period. In addition, according to Moran & Wilson-Parr (2015), there is 70% suitable habitat within the SPA as a whole. We therefore evaluate that there is no likelihood of Hen Harrier depending on the habitats within

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[31] Arroyo, B., Leckie, F., Redpath, S. (2006) Habitat Use and Range Management on Priority Areas for Hen Harriers: Final Report. Report to Scottish Natural Heritage. First draft- March 2006.
[32] Arroyo, B., Leckie, F., Amar, A., McCluskie, A. & Redpath, S. (2014) Ranging behaviour of Hen Harriers breeding in Special Protection Areas in Scotland. Bird Study 61: 48-55.

150m of the construction works areas at Mountphilips Substation site, due to separation distance and the overall extent of habitat availability.

Taking into account that the nearest nest is 4.3km from the only part of the UWF Grid Connection which could be built during the breeding season – i.e. works at Mountphlips Substation site; with studies suggesting that most foraging occurs within 2km of a nest and reduces thereafter with distance; it is evaluated that the magnitude of any disturbance or displacement effects on foraging Hen Harrier during the breeding season will be negligible both within and outside the SPA, and with the application of project design measures (in particular PD02 in relation to Mountphlips Substation site) that significant impacts are unlikely to occur.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible (approximating to 'no change') magnitude
- Works during the breeding season (March-August) will only take place at the Mountphilips Substation site. This means that no works will occur within 4.3km of any known nests, all of which are considered to be traditional nests, being used repeatedly ;
- no likelihood of reliance on any suitable foraging habitats either at the Mountphilips Substation site due to separation distance from nests, and the large amount of suitable habitat (3,580ha) within the core foraging range (2km) of the Hen Harrier nests identified
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success, and;
- the availability of suitable foraging habitat within the wider area, with 70% suitable habitat available within the SPA;
- in the context of existing background trends and disturbance is primarily related to visual intrusion, and Hen Harrier is likely to already be habituated to road-based and farming-based noise and visual intrusion;
- Effects will be momentary-Brief in duration;
- unlikely to affect any individual >150m from source, and;
- Highly reversible once any individual moves beyond 150m.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:
There is no potential for cumulative impacts with UWF Related Works (constructed outside the breeding season), UWF Replacement forestry (planted by hand), or with the UWF Other Activities Upperchurch Hen Harrier Scheme (similar to farming activities and outside temporal overlap).

Due to the separation distance from breeding season works, at the Mountphilips Substation Site, from Upperchurch Windfarm and UWF Other Activities and from other projects such as potential Bunkimalta and consented Castlewaller Windfarms (and potential grid connection), existing Milestone Windfarm and from existing Rear Cross Quarry, there is a very low probability of cumulative disturbance effects. Forestry or agricultural activities in the area, close to works at the Mountphilips Substation site, are on-going background activities, and any cumulative impact will not be noticeable.

There is no potential for cumulative impacts with the consented Upperchurch Windfarm, UWF Other Activities, existing Milestone Windfarm, potential Bunkimalta Windfarm, existing Rear Cross Quarry, potential Castlewaller Windfarm (and potential grid connection) or turf cutting activities as the UWF Grid Connection 110kV UGC works will not be carried out during the breeding season. Cumulative impacts with works at Mountphilips Substation site are unlikely to occur with the application of project design measure PD02.

Overall, the Magnitude of cumulative disturbance/displacement is therefore evaluated as being negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible (approximating to 'no change') magnitude;

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- Fact that most foraging takes place within 2km of the nest site, and no nests are within 4.3km of works which could take place during the breeding season (i.e. at the Mountphilips Substation site);
- Separation distance between Mountphilips substation site and Other Elements and Other Projects, and therefore;
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success, and;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as once-off housing, farming practices, , forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.
- Construction works for 110kV UGC outside of the Mountphilips Substation site will be not be carried out during the hen harrier breeding season March to August inclusive;

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

Element 2: UWF Related Works

Impact Magnitude: None, the UWF Related Works will be constructed outside of the Hen Harrier breeding season March to August inclusive (this includes hedgerow and scrub removal in addition to hedgerow trimming), therefore there is no potential for disturbance/displacement effects during the breeding season.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

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

Element 3: UWF Replacement Forestry

Impact Magnitude:

All planting will be done by hand. Magnitude is negligible and unlikely to occur given the separation distance to the nearest nest (6.8km)

Significance of the Impact: Neutral to Not Significant

Rationale for Impact Evaluation:

- No contrast in activities from background levels, and;
- Momentary – brief duration, with;
- High reversibility once any individual moves beyond 150m.
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success, and;

Element 4: Upperchurch Windfarm

Topic: Biodiversity

Impact Magnitude: Out of 504 ha within the footprint and 150m of the consented Upperchurch Windfarm, only 135 ha (26.8%) is suitable for Hen Harriers to forage. This falls below the 30% threshold indicated as offering and attractive landscape to Hen Harriers (Wilson *et al*., 2006). The nearest nest location to the consented Upperchurch Windfarm is 5.3km. There is evidence to show that breeding Hen Harriers rarely (<2% of the time) forage more than 4km from the nest (Arroyo *et al*., 2012). Data from field surveys also indicate very low levels of Hen Harrier use within the footprint of the consented Upperchurch Windfarm (in 2019, 120 hours of breeding season VP observations yielded a total of 200 seconds of observed Hen Harrier activity, (of which 44 seconds were within 500m of a consented UWF turbine location). Given the distance from these observations to identified nests, these are unlikely to be actively breeding birds, and the magnitude of this impact is considered to be negligible and unlikely to occur given the separation distance to the nearest nest (5.3km).

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible magnitude;
- The low proportion (<30%) of suitable habitat for foraging Hen Harriers in the footprint and 150m buffer of the consented Upperchurch Windfarm; coupled with
- The distance of separation between the consented Upperchurch Windfarm the nearest Hen Harrier nest at 5.3km,; resulting in
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success, and;
- The irregularity and low number of Hen Harrier observations during the vantage point surveys indicating that the consented Upperchurch Windfarm is used infrequently by breeding Hen Harriers.

Element 5: UWF Other Activities

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

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

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

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Existing Milestone Windfarm

Impact Magnitude: Milestone windfarm has already been constructed. Magnitude of effects is limited to operational disturbance only which is expected to be of a scale in the order of up to 250m from turbines. Habitats on site are of low value for Hen Harriers (BES, 2017). Lands are being provided and managed to provide foraging opportunities for Hen Harrier. There is overlap between the identified Hen Harrier Management Plan land parcels and the 150m zone of possible disturbance to foraging birds around UGC works, should they occur. Flight activity is low at Milestone windfarm (study area comprising a 500m radius of construction works) however and observations are not attributed to locally nesting birds (BES, 2017, 2015).

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The implementation of a HHMP to mitigate for any disturbance effects such as displacement from foraging areas;
- Thus avoiding significant consequences on breeding birds;
- Low levels of recorded activity, which are not attributed to locally nesting birds.
- The presence of low value habitats for Hen Harrier at Milestone Windfarm in the first instance, as reported.
- Distance from Milestone to identified nests, notwithstanding some overlap in Hen Harrier Management Plan lands with 150m zone of possible disturbance to foraging Hen Harriers.

Other Project: Rear Cross Quarry

Impact Magnitude: Evaluated as negligible, effectively part of the background baseline environment. The already existing quarrying operation at Shanballyedmond, near Rear Cross covers approximately 10 ha and is located

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within the Slievefelim to Silvermines Mountains SPA. No potential for secondary impacts as the quarry will be able to supply all aggregate to the Whole UWF Project within the current consented capacity of the quarry.
Significance of the Impact: Slight
Rationale for Impact Evaluation: • No contrast in activities from background levels, and; • Momentary – brief duration, with; • High reversibility once any individual moves beyond 150m. • And no increase expected.
Other Project: Castlewaller Windfarm *(consented windfarm, potential grid connection)* *Although Castlewaller Windfarm is not expected to be constructed during the same period as the UWF Grid Connection, it is nonetheless included for evaluation of cumulative effects on a precautionary basis.*
Impact Magnitude: Noise and visual intrusion during the construction period may interact with foraging individuals from 2-3 no. nests within 2km. Magnitude of Effects on Hen Harrier have already been evaluated as Negligible. Any grid connection route, which may be proposed at a future date, will be required to show no significant effects to Hen Harrier.
Significance of the Impact: Slight
Rationale for Impact Evaluation: • Primarily on the design of the windfarm allowing for the maintenance of foraging corridors and separation distance to nearest nests, and; • The extent of displacement habitat available for any disturbed birds.
Other Project: Potential Bunkimalta Windfarm *potential windfarm, consented grid connection)* *Although Bunkimalta Windfarm is not expected to be constructed during the same period as the UWF Grid Connection, it is nonetheless included for evaluation of cumulative effects on a precautionary basis*
Impact Magnitude: The consented grid connection is routed along forestry roads and public roads where it occurs within the SPA. It is assumed that any future proposed Bunkimalta Windfarm will include site design and mitigation measures to ensure that effects to Hen Harrier will not be significant (in the context of its location within a Hen Harrier SPA), this is likely to include measures in relation to disturbance and displacement, particularly from suitable habitat.
Significance of the Impact: Neutral residual effect
Rationale for Impact Evaluation: • requirement on projects within a designated site to prove that no significant adverse effects will occur
Activity: Forestry
Impact Magnitude: Disturbance from forestry operations is part of background trends, limited information is available on magnitude of this however forestry extraction is subject to Forest Service procedure for felling within the Hen Harrier breeding season, this includes full Appropriate Assessment to protect Hen Harriers within SPA's and a requirement to consider an EIA on lands outside of Natura 2000 sites (depending upon the nature of the forestry operations). It is assumed this process will be undertaken for all commercial forestry resulting in no likelihood of significant effects or adverse effects on site integrity. The magnitude of disturbance/displacement from forestry activities is evaluated as negligible.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • No contrast in activities from background levels, and; • Brief-Temporary duration, with; • High reversibility once any individual moves beyond 150m. • Forestry activities are subject to Appropriate Assessment of their effects on Hen Harrier.

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Activity: Agriculture
Impact Magnitude: Evaluated as negligible, effectively same as background.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • No contrast in activities from background levels, and; • Brief-Temporary duration, with; • High reversibility once any individual moves beyond 150m.
Other Project: Turf-cutting
Impact Magnitude: Evaluated as negligible, effectively same as background.
Significance of the Impact: Neutral
Rationale for Impact Evaluation: • No contrast in activities from background levels, and; • Momentary – brief duration, with; • High reversibility once any individual moves beyond 150m.
Evaluation of Other Cumulative Impacts – Disturbance/Displacement of foraging Hen Harrier during the breeding season
Whole UWF Project Effect
Cumulative Impact Magnitude: The spatial extent of the Whole UWF Project effect during the breeding season relates to the Mountphilips Substation site to the west of the upland area, and the Upperchurch Windfarm site on the eastern side of the upland area. UWF Other Activities may also take place at both of these locations, in addition to other locations in the wider area (all of which will be outside, and at a distance from, the SPA). Works during the breeding season may also include planting works for UWF Replacement Forestry. No works for either the 110kV UGC (outside of the Mountphilips Substation site) or for the UWF Related Works will occur during the breeding season. Overall the magnitude is evaluated as negligible.
Significance of the Cumulative Impact: Not Significant
Rationale for Cumulative Impact Evaluation: • Very High Sensitivity rating for Hen Harrier and negligible magnitude of impact; • Fact that most foraging takes place within 2km of the nest site, • no nests are within 4.3km of works during the breeding season; • Very low probability of foraging birds occurring with sufficient frequency at Mountphilips Substation site to result in significant consequences on nesting birds or breeding success, and; • Separation distance between works at Mountphilips Substation site and works in the Upperchurch Windfarm area; • Noise/Vibration/Intrusion unlikely to affect any individual >150m from source; • Birds likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and; • The duration of effects, (momentary-brief) and; • High reversibility once the bird moves beyond 150m. • Construction works for the 110kV UGC (outside of Mountphilips Substation site) and for UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive, avoiding any potential for sequential effects with Other Elements or Other Projects; • The distance to the nearest confirmed nest locations.

Hen Harrier

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All Elements of the Whole UWF Project with Other Projects or Activities
Cumulative Impact Magnitude: There is potential for disturbance to breeding foraging hen harriers resulting from the Whole UWF Project, and existing Milestone Windfarm, existing Rearcross Quarry and agricultural, forestry and turf cutting activiites in the surrounding area, along with (potentially) Castlewaller Windfarm, and Bunkimalta Windfarm. Magnitude of effects from the Whole UWF Project is evaluated above as Negligible. When the Other Projects and Activities are collectively taken into account, the magnitude of effect will be negligible.
Significance of the Cumulative Impact: Not Significant to Slight (negative)
Rationale for Cumulative Impact Evaluation: • Very High sensitivity rating for Hen Harrier, and Negligible magnitude; • Construction works for UWF Grid Connection during the breeding season limited to Mountphilips Substation site which puts works during the breeding season further than 4km from nest sites, avoiding any disturbance effects; • Construction works for the 110kV UGC (outside of Mountphilips Substation site) and for UWF Related Works will be not be carried out during the Hen Harrier breeding season March to August inclusive, avoiding any potential for sequential effects; • The distance to the nearest confirmed nest locations in respect of the UWF Grid Connection (Mountphilips Substation site – 4.3km), Consented Upperchurch Windfarm (5.3km from nearest turbine base), and UWF Replacement Forestry (6.8km from the afforestation lands); • Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km • Noise/Vibration/Intrusion unlikely to affect any individual >150m from source; • Birds likely to be habituated to various background activities such as traffic, farming practices, road maintenance, quarrying, forestry practices; • The duration of effects, (momentary-brief); • High reversibility once the individual bird moves beyond 150m; and • The separation distance from UWF Grid Connection works at Mountphilips Substation site and Consented Upperchurch Windfarm from Castlewaller Windfarm site or Bunkimalta Windfarm site (both greater than 4km) precludes sequential effects.

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8.6.4.3 Impact Evaluation Table: Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Impact Description: Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Project Life Cycle Stage:	Construction stage

Impact Source: noise and visual intrusion; operating machinery; presence of construction personnel

Cumulative Impact Source: noise and visual intrusion; operating machinery; presence of construction personnel associated with Upperchurch Windfarm, UWF Related Works, UWF Replacement Forestry and UWF Other Activities; and associated with farming and forestry management activities, turf-cutting, quarrying works and *potentially* other windfarm construction sites.

Impact Pathway: Air, Visibility

Impact Description:

Between the period September to February inclusive, Hen Harriers are considered to be in their non-breeding season (Watson, 1977). During the non-breeding season, Hen Harriers may move substantial distances from their breeding areas, including immigration into Ireland from the UK (Wernham *et al.*, 2002; Etheridge & Summers, 2006), as well as movements within Ireland (Irwin *et al.*, 2011). This reduces reliance on habitats proximal to breeding areas, with Hen Harriers making substantial movements during the non-breeding season, which indicates that Harriers are less likely to be sensitive to disturbance during the non-breeding season compared to during the nesting season (when Hen Harriers are typically limited to foraging with 2km of nesting locations (Arroyo *et al.*, 2014) with studies suggesting that most foraging occurs within 2km of a nest and reduces thereafter with distance). In addition, the effects of disturbance in the non-breeding season are at an individual level rather than affecting chicks/nest success.

A minimum approach distance (MAD) as a function of flight initiation distance (FID) is used to determine the likelihood of any effect on an individual. There have been no specific studies examining the FID of foraging Hen Harriers to human disturbance. However, a study on FIDs on Northern Harrier *Circus cyaneus* from aircraft suggested a mean FID of 70m (Booms *et al.,* 2010) implying that birds may react to disturbance of similar magnitude (90db) at a distance of 105m. In a wider review of FIDs, Livesey et al. (2016) indicated a mean FIDs for Falconiformes of 89.7m (MAD 134.5m) (for pedestrian-based disturbance) and 79.7m (MAD 119.5m) (for motorised vehicles). Collectively, these data would suggest that foraging Hen Harriers are unlikely to be impacted by disturbance events over 150m away. Hen Harrier will also be habituated to certain background activities such as traffic and machinery on roads and on farmlands and would be expected to react less to artificial noise than to the presence of humans.

Therefore, construction works and the presence of construction personnel are unlikely to result in any noticeable effect on foraging Hen Harriers more than 150m away from the point of disturbance. A 150m buffer of the proposed development is taken as the zone wherein effective habitat loss may take place following disturbance through noise or visual intrusion, should suitable foraging habitat be present within this radius of works. Due to the linear nature of the 110kV UGC, disturbance and effective habitat loss through displacement would be brief to temporary in nature, whereas any disturbance/displacement from works at the Mountphilips Substation site will be temporary in nature.

UWF Grid Connection works during the non-breeding season relates to all works areas for UWF Grid Connection, i.e. the Mountphilips Substation site and the 110kV UGC works, which are predominantly on public roads between the Mountphilips Substation site and the Consented UWF Substation compound. 110kV UGC works on the public road network include works on the Regional Road R503, which is located within the boundary of the SPA. To reiterate, as per Project Design, no works will take place outside of the Mountphilips Substation site during the Hen Harrier breeding season, this means that any works within the SPA boundary will only be carried out during the non-breeding season.

In relation to cumulative effects, multiple sources of noise and visual intrusion will occur in and on both sides of the upland area, during the same period of time.

Hen Harrier

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While the 110kV UGC works in the Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola townlands area will be carried out during the same period as UWF Related Works and Upperchurch Windfarm construction works. The magnitude of impact is reduced through the application of project design (which was developed for the protection of residential amenity, but also will reduce the magnitude of cumulative or sequential effects to hen harrier):
PD07 - 110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads; and
PD11 - Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Winter hunting grounds cover a much wider range and greater variety of habitats than Summer (Watson, 1977). Based on studies conducted for the previous planning application (PL92 .301959) the winter population of the UWF Grid Connection study area is estimated as 0-5 birds (based on a maximum of 5 birds recorded concurrently (for the 2018 application) across all roosts on any given day, from 2 winter seasons of effort). This has the potential to increase or decrease dependant on inter-annual variation, weather or other factors. Likely noise levels from construction are evaluated as negligible in the context of existing background trends and disturbance is primarily related to visual intrusion.

Habitat surveys of lands within 150m of the UWF Grid Connection works (150m is considered to be the distance from construction works where disturbance/displacement could occur) indicate that there is potentially 345ha (36%) of foraging habitats where Hen Harriers could be disturbed, which overlap proposed works during the winter period (this would only represent a maximum disturbance should all works be taking place concurrently). Furthermore, this area forms a very small proportion of the available suitable foraging habitat in the wider landscape. For example, a similar calculation on habitat availability for foraging Hen Harriers within 2km of the UWF Grid Connection works indicates that there are some 4,842 ha (39%) of suitable habitats and, according to Moran & Wilson-Parr (2015), there is 70% suitable habitat (ca. 14,642Ha) within the wider SPA as a whole. On this basis there is no likelihood /probability of Hen Harrier exclusively depending on the habitats within 150m of the UWF Grid Connection works during the winter months, thus reducing any likelihood of significant effects.

Overall, the Magnitude of cumulative disturbance/displacement is therefore evaluated as being negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible magnitude;
- Birds will already be habituated to road-based noise and visual intrusion;
- Effects will be momentary-brief in duration;
- unlikely to affect any individual >150m from source; and
- Highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available ;
- Demonstrated low numbers of Hen Harriers wintering in the vicinity.
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently.

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Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:

Due to the separation of the UWF Grid Connection works along the R503 from potential Bunkimalta Windfarm (greater than 4km), it is unlikely thatany cumulative disturbance effects will occur. In respect of consented Castlewaller Windfarm and existing Milestone Windfarm (including some of the Milestone Windfarm Hen Harrier management plan lands) and existing Rear Cross Quarry, all occur in close proximity to works proposed during the winter months resulting in the potential for sequential effects due to the nomadic nature of wintering Hen Harriers. In relation to Castlewaller Windfarm potential grid connection works, there is potential for sequential or combined works on the local road along the 110kV UGC on the L6009-0 and R503 roads (where the 110kV UGC is currently proposed and where part of the Castlewaller grid connection route (L6009-0) and a new access point from the R503 for the Castlewaller grid connection works was also indicated during SID pre-application discussions with An Bord Pleanála during 2019).

The magnitude of cumulative effects is evaluated as negligible in relation to existing Milestone Windfarm, potential Bunkimalta Windfarm and existing Rear Cross Quarry, and negligible in relation to consented Castlewaller Windfarm and its potential grid connection.

There is also potential for cumulative impacts via disturbance with Other Elements such as Upperchurch Windfarm, UWF Related works, UWF Replacement Forestry and with the UWF Other Activities Upperchurch Hen Harrier Scheme at the eastern end of the 110kV UGC route within the UWF Grid Connection Cumulative Evaluation Study Area through the accumulation of single disturbance events on foraging birds moving through the landscape. The magnitude of cumulative impacts relates to the potential for concurrent activity encountered sequentially by foraging birds as they move through the areas where works are being undertaken.

The potential for sequential cumulative effects on wintering Hen Harriers is largely mitigated by the scale and availability of suitable displacement habitat, the low numbers overall wintering in the vicinity, and the brief to momentary nature of any individual disturbance event, which is unlikely to result in any significant stress on a foraging Hen Harrier, as typically wintering birds are habituated to moving through the wider Irish landscape and encountering sources of intrusion/disturbance.

The potential for cumulative impacts with nearby forestry, agricultural or turf-cutting activities is primarily related to traffic movements associated with these on the R503, and is evaluated as low.

Overall the magnitude of cumulative disturbance is evaluated as negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible Magnitude;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.
- availability of foraging habitats within the wider area (4,842ha (39%) within 2km of the UWF Grid Connection works and 70% suitable habitat within the SPA as a whole).
- Habituation by wintering harriers to foraging widely through the landscape.

Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently.

Hen Harrier

Sensitive Aspect

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

Element 2: UWF Related Works

Impact Magnitude: Likely noise levels from construction are evaluated as negligible in the context of existing background trends and disturbance is primarily related to visual intrusion.

UWF Related Works will be constructed during the September to February period; disturbance/displacement impacts to foraging Hen Harrier could therefore occur during this time.

Habitat surveys of lands within 150m of the UWF Related Works (150m is considered to be the distance from the disturbance/displacement where impacts on foraging Hen Harrier could occur) indicate that there is potentially 152ha (27%) of foraging habitats where Hen Harriers could be disturbed. However, this forms a very small proportion of the available suitable foraging habitat in the wider landscape. A similar calculation on habitat availability within 2km of the UWF Related Works indicates that there are some 2,050 ha (38%) of suitable habitats within 2km and, according to Moran & Wilson-Parr (2015), there is 70% suitable habitat within the SPA as a whole. We therefore evaluate that there is no likelihood/probability of wintering Hen Harrier depending on the habitats within 150m of the UWF Related Works due to the overall extent of habitat availability.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible magnitude;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.
- availability of foraging habitats within the wider area (2,050ha (38%) within 2km of the UWF Related Works and 70% suitable habitat within the SPA as a whole).

Element 3: UWF Replacement Forestry

Impact Magnitude:

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

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- No contrast in activities from background levels, and;
- Momentary – brief duration, with;
- High reversibility once any individual moves beyond 150m.
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently, and;

Element 4: Upperchurch Windfarm

Impact Magnitude:

Out of 504 ha within the footprint and 150m of the consented Upperchurch Windfarm, only 135 ha (27%) is suitable for Hen Harriers to forage. Data from field surveys also indicate very low levels of Hen Harrier use within the footprint of the consented Upperchurch Windfarm (in 2 years of additionally commissioned Hen Harrier surveys carried out from March 2015 to April 2017, a representative sample of 379 hours of winter season (Oct-March inclusive) VP observations yielded a total of 600 seconds of observed Hen Harrier activity, (of which 240 seconds were within 150m of works locations (Ecopower Developments 2015, 2016 and 2017). Due to the low proportion of suitable habitat at the windfarm site, the low numbers of Hen Harrier recorded during the winter season, and the availability of suitable habitat in the wider landscape (36% within 2km, 70% within the SPA), it is considered that the magnitude of disturbance/displacement will be negligible.

Biodiversity

Topic

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
- Very High sensitivity of the species and Negligible Magnitude,
- Low levels of recorded Hen Harrier activity during the winter;
- The low proportion (<30%) of suitable habitat for foraging Hen Harriers in the footprint and 150m buffer of the consented Upperchurch Windfarm; coupled with
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.
- Availability of foraging habitats for Hen Harrier within the wider area (1,846ha (36%) within 2km of the Consented Upperchurch Windfarm and 70% suitable habitat within the SPA as a whole).
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently, and;

Element 5: UWF Other Activities

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

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
- No contrast from background levels of noise of intrusion is expected, and;
- Wintering Hen Harriers will already be habituated to road-based noise and visual intrusion;
- Overhead Line Activities will compare to existing maintenance activities;
- Effect duration will be brief to momentary for most activities, and;
- Highly reversible once any individual moves beyond 150m.

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Milestone Windfarm

Impact Magnitude: Milestone windfarm has already been constructed. Magnitude of effects is limited to operational disturbance only which is expected to be of a scale in the order of up to 250m from turbines. Habitats on site are of low value for Hen Harriers (BES, 2017). Lands are being provided and managed to provide foraging opportunities for Hen Harrier. There is overlap between the identified Milestone Windfarm Hen Harrier Management Plan (HHMP) land parcels and the 150m zone of possible disturbance to foraging birds around 110kV UGC works, should they occur.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
- Wintering Hen Harriers will already be habituated to ambient noise and visual intrusion;
- Effect duration will be brief to momentary for most events, and;
- Highly reversible once any individual moves beyond 150m.
- The implementation of a HHMP to mitigate for any operational disturbance effects such as displacement from foraging areas;
- The presence of low value habitats for Hen Harrier at Milestone Windfarm in the first instance, as reported.
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently.

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Sensitive Aspect: Hen Harrier

Other Project: Rear Cross Quarry
Impact Magnitude: Evaluated as negligible, effectively same as background. No potential for secondary impacts as there the quarry will be able to supply all aggregate to the Whole UWF Project within the current consented capacity of the quarry.
Significance of the Impact: Neutral
Rationale for Impact Evaluation: • No contrast in activities from background levels, and; • High reversibility once any individual moves beyond 150m. • And no increase expected.
Other Project: Castlewaller Windfarm *(consented windfarm, potential grid connection)* *Although Castlewaller Windfarm is not expected to be constructed during the same period as the UWF Grid Connection, it is nonetheless included for evaluation of cumulative effects on a precautionary basis.*
Impact Magnitude: Noise and visual intrusion during the construction period may interact with foraging individuals should it overlap the winter period. Magnitude of effects on Hen Harrier have already been evaluated as Negligible. Any grid connection route, which may be proposed at a future date, will be required to show no significant effects to Hen Harrier included through disturbance related pathways.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The potential for interaction during the winter months, notwithstanding; • Wintering Hen Harriers will already be habituated to ambient noise and visual intrusion; • Effect duration will be brief to momentary for most activities, and; • Highly reversible once any individual moves beyond 150m. • The extent of displacement habitat available for any disturbed birds. • Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently.
Other Project: Potential Bunkimalta Windfarm *potential windfarm, consented grid connection)* *Although Bunkimalta Windfarm is not expected to be constructed during the same period as the UWF Grid Connection, it is nonetheless included for evaluation of cumulative effects on a precautionary basis*
Impact Magnitude: The consented grid connection is routed along forestry roads and public roads where it occurs within the SPA. It is assumed that any future proposed Bunkimalta Windfarm will include site design and mitigation measures to ensure that effects to Hen Harrier will not be significant (in the context of its location within a Hen Harrier SPA), this is likely to include measures in relation to disturbance and displacement, particularly from suitable habitat.
Significance of the Impact: Neutral residual effect
Rationale for Impact Evaluation: Requirement on projects within a designated site to prove that no significant adverse effects will occur.
Activity: Forestry
Disturbance from forestry operations is part of background trends. Limited information is available on magnitude of this, however forestry extraction is subject to Forest Service procedure for felling within the Hen Harrier breeding season. This includes full Appropriate Assessment to protect Hen Harriers within SPA's, which should take account of wintering Hen Harrier. It is assumed this process will be undertaken for all commercial forestry resulting in no likelihood of significant effects or adverse effects on site integrity. The magnitude of disturbance/displacement from forestry activities on wintering Hen Harrier is evaluated as negligible.
Significance of the Impact: Neutral to Not Significant

Rationale for Impact Evaluation:
- Precautionary basis
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently.

Activity: Agriculture

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

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
- No contrast in activities from background levels, and;
- Brief-Temporary duration, with;
- High reversibility once any individual moves beyond 150m.

Other Project: Turf-cutting

Impact Magnitude: Evaluated as negligible, effectively same as background – no turf cutting is likely during the winter months.

Significance of the Impact: Neutral

Rationale for Impact Evaluation:
- Restrictions on further turf cutting in intact areas/protected areas, and;
- The limited extent of lands subject to turbary (rights to cut turf) within the Hen Harrier SPA overall (4%), with little of this occurring within the Cumulative Evaluation Study Areas or likely to occur in winter;
- The reversibility of any effect, (in the context of Hen Harrier) with birds expected to continue to utilize re-vegetating cutover bog for foraging.

Evaluation of Other Cumulative Impacts – Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Whole UWF Project Effect

Magnitude:
Habitat surveys of lands within 150m of the construction works (150m is considered to be the distance from construction works where disturbance/displacement could occur) indicate that there is potentially 345ha of foraging habitats where Hen Harriers could be disturbed within 150m of UWF Grid Connection works; and 480ha of foraging habitats where Hen Harriers could be disturbed within 150m of UWF Related Works/Upperchurch Windfarm works, during the winter period (this would only represent a maximum disturbance should all works be taking place concurrently). These works will be spread over a wide linear area from the Mountphilips Substation site on the western side of the upland area, along public roads through the upland area, and on lands on the eastern side of the upland area. Furthermore, the lands within 150m of construction works form a very small proportion of the available suitable foraging habitat in the wider landscape. The Mountphilips Substation site contains only a small area of suitable foraging habitat with the site generally under improved grassland. No disturbance effects are anticipated for construction at the Upperchurch Windfarm/UWF Related Works area during the winter months due to low numbers of Harriers recorded within the greater area. Overall, the Magnitude of cumulative disturbance/displacement is therefore evaluated as being negligible.
In respect of UWF Replacement Forestry, all planting will be done by hand. UWF Other Activities will be small in scale and similar to background farming activities. The Magnitude of both of these activities will be negligible.

Significance of the Cumulative Impact: Not Significant

Rationale for Impact Evaluation:
- Very High sensitivity rating for Hen Harrier and Negligible magnitude;
- Birds will already be habituated to road-based noise and visual intrusion;
- Effects will be momentary-brief in duration;
- unlikely to affect any individual >150m from source; and

Hen Harrier

Sensitive Aspect

- Highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available; and
- Demonstrated low numbers of Hen Harriers wintering in the vicinity.
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently.

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

Cumulative Impact Magnitude:

The magnitude of foraging habitat loss resulting from the Whole UWF Project, existing Milestone Windfarm, existing Rearcross Quarry, Agriculture and Turf Cutting in the vicinity, along with *potentially* Castlewaller Windfarm and Bunkimalta Windfarm, are evaluated as being negligible.

Forestry activities in the surrounding area is generally a negative trend in the background environment currently with declines in available foraging habitat in the short-medium term (next 10 years & expected to increase subsequently) and evaluated of Medium magnitude in that regard. No turf cutting is likely to take place during winter months and agriculture is likely to be the same as existing baseline. There is some potential for birds to encounter sources of noise or visual intrusion sequentially as they move through the landscape.

Overall magnitude is evaluated as negligible.

Significance of the Cumulative Impact: Not Significant

- Rationale for Cumulative Evaluation:
- Very High sensitivity rating for Hen Harrier, and Negligible magnitude ;
- The potential for sequential events, however;
- Wintering Harriers are likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and;
- Very low probability of foraging birds occurring with sufficent frequency to result in significant consequences on nesting birds or breeding success subsequently, and;
- Effects will be momentary-brief in duration;
- unlikely to affect any individual >150m from source; and
- Highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available;
- Demonstrated low numbers of Hen Harriers wintering in the vicinity.

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8.6.4.4 Impact Evaluation Table: Reduction in Prey Item Species

Impact Description	
Project Life Cycle Stage:	Construction stage/Operational Stage

Impact Source: Land cover change, vegetation clearance, noise and visual intrusion; operating machinery; presence of construction personnel

Cumulative Impact Source: Excavations, Land Cover Change, Forestry Felling, removal of Hedgerows, land cover change from agricultural practices such as drainage, peat extraction

Impact Pathway: Mortality/Displacement

Impact Description: Hen Harrier preferred prey species are typically described as those of open ground, such as Meadow Pipit (*Anthus pratensis*) and Skylark (*Alauda arvensis*). Hen Harriers breeding numbers are typically correlated with the abundance of small mammals in the UK (Redpath *et al.,* 2002a; 2002b; Thirgood *et al*., 2003), however this relationship does not appear to exist in Ireland perhaps due to the absence of short-tailed vole (*Microtus agrestis*) (see O'Donoghue, 2010). Preferred prey species in Ireland have been described as Meadow Pipit, Wood Mouse (*Apodemus sylvaticus*) and other small passerines during the breeding season with Meadow Pipit, Brown Rat (Rattus norvegicus) and wintering thrushes predominating in winter (O'Donoghue, 2010).

In a published study of 900 Hen Harrier pellets in Ireland covering winter and breeding seasons, Hen Harriers were found to have a diverse diet, which varies between areas and seasons and includes small mammals, birds, amphibians and reptiles - up to 78% of the diet of Hen Harriers in Ireland was shown to comprise passerine species of birds (Irwin *et al.,* 2012). Winter diet at coastal roosts found various bird species forming 77.2% of diet (by percentage frequency); birds were predominantly passerines (Smiddy & Cullen, 2017).

Reductions in the availability of Prey Items (passerine songbirds, small mammals, reptiles and amphibians) may disadvantage foraging Hen Harriers, in particular during the breeding season when provisioning young. These reductions will typically be related to construction stage disturbance displacement (although this is likely to be temporary in duration and reversible) and any operational habitat loss (as habitat loss or loss in quality of existing habitat may have a direct effect on the composition and numerical abundance of the prey that inhabit it) and therefore consideration is given to both.

Intensity of agricultural management is known to negatively affect densities of songbirds with small mammal abundance in grassland related to the height and diversity of vegetation present. The effects of Habitat Loss (permanent or Temporary Reduction or Loss of Suitable Habitat and the effects thereof on Hen Harrier are considered separately in this EIAR- (see Impact Evaluation Table 8.6.4.1).

Impact Quality: neutral, negative and positive

Evaluation of the Subject Development Impact – Reduction in Prey Item Species

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

General mammal species such as Brown Rat, Shrews, Mice, Bank Vole, Hare and Rabbit have been scoped out from consideration due to the limited extent of permanent land cover change of natural habitats, the general low densities likely to be present (resulting in an importance evaluation of Local Importance, Lower Value) and the high likelihood of no observable changes to existing trends as a result of the proposed UWF Grid Connection development (see Section 8.9). Residual impacts on Amphibians and Reptiles have been evaluated as Neutral (see Section 8.10). As per Section 8.7 of this report, residual impacts on General Birds range from Imperceptible or Neutral to Slight (Positive). Effects on Meadow Pipit from the UWF Grid Connection were evaluated as 'not significant' due to the limited extent of land cover change, only at Mountphilips Substation site. This land cover change has also been evaluated as to its effect on Hen Harrier through loss of foraging habitat and found to be negligible in magnitude. A potential reduction in prey item availability only relates to the Mountphilips Substation Site, where suitable foraging habitat comprising 0.05ha will be lost – evaluated as negligible. Numbers of prey items likely to occur within this area are considered less than negligible in the context of prey availability,

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for example a typical Meadow Pipit average home range size of 2.18ha has been described, inferring at most a single pair of pipits could be lost permanently.

Overall magnitude is evaluated as Negligible, i.e. barely distinguishable and approximating to a 'no change' situation.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The very high sensitivity of the species and negligible magnitude, however;
- No noticeable changes in the character of the environment from a prey availability perspective are predicted.
- Distance from the only source (Mountphilips Substation site) of a reduction in Prey Items to the nearest hen harrier nest (greater than 4km).

Element 2: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:

A potential reduction in prey item availability only relates to the Mountphilips Substation Site, where suitable foraging habitat comprising 0.05 ha will be lost – evaluated as negligible. Any reduction in prey items likely to occur within this area are considered less than negligible. Based on separation distance to the nearest nest (Nest A), and the available of suitable habitat described, there is no potential source of cumulative effects. Due to the above, it is evaluated that there is no potential for any reduction in prey item availability at the Mountphilips Substation site to cumulatively affect Prey Availability in combination with consented Castlewaller Windfarm and potential grid connection or potential Bunkimalta Windfarm and consented grid connection, Forestry or Turf Cutting Activities in the area. In addition, the hen harrier management plans for the windfarm sites will result in Neutral impacts from these projects. Synergistic effects on any other nests can also be excluded. In relation to Agriculture, no changes in the baseline agricultural practices in the immediate landholdings around the Mountphilips Substation site are planned or likely to occur in the short term i.e. any additional sources which may exacerbate prey item reduction effects in particular during the construction stage are negligible.

Due to the separation distance from any possible reduction in prey items (i.e. at Mountphilips Substation site) to the Other Elements of the Whole UWF Project, Rear Cross Quarry or Milestone Windfarm it is considered that no cumulative effects will occur.

Overall magnitude is evaluated as Negligible, i.e. barely distinguishable and approximating to a 'no change' situation.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The very high sensitivity of the species and negligible magnitude, however;
- No noticeable changes in the character of the environment from a prey availability perspective are predicted.
- Distance from the only source (Mountphilips Substation site) of a reduction in Prey Items to the nearest nest.
- Distance from the only source of a reduction in Prey items to Other Elements of the Whole UWF Project
- Distance from the only source of a reduction in Prey Items to the other Projects and Activities described.

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

Element 2: UWF Related Works

Impact Magnitude:

General mammal species such as Brown Rat, Shrews, Mice, Bank Vole, Hare and Rabbit have been scoped out from consideration due to the limited extent of permanent land cover change of natural habitats, the general low densities likely to be present (resulting in an importance evaluation of Local Importance, Lower Value) and the high likelihood of no observable changes to existing trends as a result of the UWF Related Works. Residual impacts on Amphibians and Reptiles have been evaluated as Neutral. The impact magnitude of habitat loss on Meadow Pipit (as a receptor) was evaluated as negligible. The likelihood of significant effects on other passerine

species were excluded. The nearest Hen Harrier nest to UWF Related Works (H1) is 4.5km, on this basis foraging habitat loss for Hen Harrier was evaluated as negligible.

Overall any reduction in prey items for Hen Harrier is evaluated as negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The very high sensitivity of the species, and Negligible magnitude however;
- Some noticeable changes in the character of the environment from a prey availability perspective to Hen Harrier may be possible;
- The extent of suitable habitat for Meadow Pipit to be affected represents a minor shift away from baseline conditions, and;
- Effects are ameliorated by virtue of distance to the nearest nest, resulting in an evaluation of no reliance on foraging habitats at the site and in turn prey items which may be present at the UWF Related Works Site.

Element 3: UWF Replacement Forestry

Impact Magnitude:
While the UWF Replacement Forestry will be of benefit to Hen harrier in the long term, during its planting it has potential to disturb or displace prey items with land cover change during operation also requiring consideration.

General mammal species such as Brown Rat, Shrews, Mice, Bank Vole, Hare and Rabbit have been scoped out from consideration due to the limited extent of planting works, the general (low) densities likely to be present (resulting in an importance evaluation of Local Importance, Lower Value) and the high likelihood of no observable changes to existing trends as a result of the proposed development. No measurable impacts were predicted on Amphibians and Reptiles and therefore no likely significant effects are reasonably foreseeable. The impact magnitude of habitat loss on Meadow Pipit was evaluated as slight based on the change of 3.98Ha of suitable habitat to forestry- inferring up to 2 pairs of Meadow Pipit may be affected. However, the magnitude of displacement of Meadow pipit during the planting stage/early growth stage of the new woodland is reduced through the planting by hand of the new trees, no requirement to clear grass from the site, and the very short duration of works. It is considered that the lands will remain available to Meadow Pipit for a number of years while the new trees start to establish – however in the long term some habitat for ground nesting birds will be lost, to be replaced with habitat for other passerine species, which will also be potentially available to Hen Harrier as prey items. The likelihood of significant negative quality effects on other passerine species were excluded. The nearest Hen Harrier nest to UWF Replacement Forestry (H1) is 6.8km, on the basis of the proposed management of the afforested lands for Hen Harrier, the effects of land cover change on Hen Harrier foraging habitat were evaluated as Very Significant (positive).

Overall any reduction in the availability of prey items for Hen Harrier is evaluated as Low (Positive).

Significance of the Impact: Moderate (Positive)

Rationale for Impact Evaluation:

- The very high sensitivity of the species, and negligible magnitude;
- Some disturbance/displacement of Meadow Pipit during planting and long term due to land cover change is likely, however;
- Planting works will be carried out by hand, and will not involve the clearance of grass from the lands. The lands will become available to prey items immediately after planting works are complete until the new trees start to establish.
- Effects are reduced by the relatively small extent and duration of works, the replacement of open habitats with habitats to be managed for Hen Harrier and by virtue of distance to the nearest Hen Harrier nest;
- Management measures will also provide foraging opportunities for Hen Harrier, of permanent duration

Element 4: Upperchurch Windfarm

Impact Magnitude: The 2013 EIS recorded various prey items as present or likely to be present including Field Mice, Pygmy Shrew, Rabbit, Irish Hare, Common Lizard, Common Frog in addition to passerine bird

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Hen Harrier	species including Meadow pipit, Skylark and thrushes. During construction effects on fauna including through noise and anthropogenic effects were evaluated as of low magnitude, temporary in duration and limited to the construction phase with the overall impact not significant. Any reduction in prey item availability to Hen Harrier is evaluated as negligible in the context of distance from nearest nests - H1 is 5.3km. In terms of operational effects, the magnitude of foraging habitat loss was estimated as 95Ha (now revised to 100.22Ha to reflect a construction year of 2020/2021). 128ha of lands are to be provided and managed as favourable foraging areas including habitats specifically targeted at providing prey for Hen Harrier such as passerine birds and small mammals. A reduction in the intensity of management and the reversion of some fields back to wet grassland will improve the availability of small mammals and birds for Hen Harrier.
	Significance of the Impact: Neutral
	Rationale for Impact Evaluation: • Very High sensitivity of the species, and Negligible magnitude; • Effects are ameliorated by virtue of distance to the nearest nest, resulting in an evaluation of no reliance on foraging habitats at the windfarm site and in turn prey items present at the windfarm site • The implementation of the Upperchurch Hen Harrier Scheme, as conditioned; • Long term duration.
	Element 5: UWF Other Activities
	Impact Magnitude: Due to their scale and nature, the magnitude of any disturbance effect to prey items (and resultant reduction in numbers available to hen harrier) as a result of Haul Route Activities, Monitoring Activities, or Overhead Line Activities will be negligible. Activities for the Upperchurch Hen Harrier Scheme will take place in agricultural lands, where prey item species may occur. However, these activities will be similar to background farming activities. Overall the magnitude of reduction in prey item availability will be negligible. In total the UHHS will provide 128ha of habitat which will be managed to increase the area of Hen Harrier foraging habitat, measures set down in the Upperchurch Hen Harrier Scheme to achieve this include: Rush management to control coverage and increase suitability for foraging habitat, promoting prey item species; 2,085m increase in hedgerow, resulting in increased edge habitat for foraging and prey items; 3ha enclosures of native scrub and trees, increased cover for prey item species
	Significance of the Impact: Very Significant (positive)
	Rationale for Impact Evaluation: • Very High sensitivity of the species, and; • The implementation of the Upperchurch Hen Harrier Scheme, as conditioned;
	Cumulative Information: Individual Evaluations of Other Projects or Activities
	Other Project: Existing Milestone Windfarm
Biodiversity	Impact Magnitude: Effective Habitat Loss of Hen Harrier habitat occurs were suitable habitat is present within 250m of each existing turbine (n=4) location. However, an area of lands at Knockcurraghbola Commons will be managed as part of a Hen Harrier Management Area for the lifetime of the windfarm for the benefit of Hen Harrier- comprising 10.8ha. This includes rush management, nutrient management, weed control, and the maintenance of edge habitat- all of which should benefit prey items such as small mammals and ground nesting passerine species of birds for Hen Harrier.
	Significance of the Impact: Neutral Residual Effect
Topic	Rationale for Impact Evaluation:

- The impact is evaluated as neutral given the effective habitat loss of Hen Harrier foraging habitat is mitigated by lands proposed to be managed for the benefit of Hen Harrier, over the lifetime of the wind farm, including the management of habitat for Prey Items.

Other Project: Rear Cross Quarry

Impact Magnitude:
The already existing quarrying operation at Shanballyedmond, near Rear Cross covers approximately 10 ha and is located within the Slievefelim to Silvermines Mountains SPA. No additional habitat loss (beyond that consented) is predicted in respect of existing quarrying operations thus no reduction in the availability of prey items will be associated with the use of this quarry (including for the supply of aggregate for the Whole UWF Project). The consented operation also includes lands under management for Hen Harrier.

Significance of the Impact: Neutral

Rationale for Impact Evaluation:

- the effective habitat loss is exactly equivalent to the area to be managed for the benefit of Hen Harrier, over the lifetime of the quarry.
- Although within the SPA, there no known expansion plans and the volumes of aggregate required for the Whole UWF Project will be supplied within the current consented capacity of the quarry.

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

Although Castlewaller Windfarm is not expected to be constructed during the same period as the UWF Grid Connection, it is nonetheless included for evaluation of cumulative effects on a precautionary basis.

Impact Magnitude:
Residual effects on general flora and fauna, including small mammals and amphibians and reptiles were evaluated as insignificant. A very low significance rating was applied to effects of a wind farm at the site to Red Grouse, Golden Plover and 'all other avian species'. Effective Habitat Loss of Hen Harrier habitat will occur within 250m of each turbine location, where harriers use second rotation aged 3-9 years-estimated at 47.9Ha. However, as conditioned under the windfarms planning permission, 47.9Ha of clear-felled forestry will be managed, including the creation of suitable foraging habitat for Hen Harrier, for the lifetime of the windfarm. The potential grid connection for Castlewaller Windfarm is primarily routed along paved surfaces or existing forestry roads and tracks. Any impact magnitude where it overlaps the Hen Harrier SPA will have to be such so that adverse effects on the integrity of the European Site are avoided.

Significance of the Impact: Neutral residual effect

Rationale for Impact Evaluation:

- The impact is evaluated as neutral given the effective habitat loss is exactly equivalent to the area to be managed and improved for the benefit of Hen Harrier, over the lifetime of the wind farm.

Other Project: Potential Bunkimalta Windfarm *potential windfarm, consented grid connection)*

Although Bunkimalta Windfarm is not expected to be constructed during the same period as the UWF Grid Connection, it is nonetheless included for evaluation of cumulative effects on a precautionary basis

Impact Magnitude:
The consented grid connection is routed along forestry roads and public roads where it occurs within the SPA. It is assumed that any future proposed Bunkimalta Windfarm will include site design and mitigation measures to ensure that effects to Hen Harrier will not be significant (in the context of its location within a Hen Harrier SPA), this is likely to include measures in relation to disturbance and displacement, particularly from suitable habitat.

Significance of the Impact: Neutral Residual Effect

Rationale for Impact Evaluation:

- Requirement on projects within a designated site to prove that no significant adverse effects will occur.

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Activity: Forestry in the surrounding area
Impact Magnitude: Hen Harrier in Ireland makes extensive use of both first and second rotation pre-thicket forest habitat during the breeding period. However, by its successional nature forests inevitably matures and become less suitable (Avery & Leslie, 1990; Madders, 2000; 2003; O'Donoghue, 2004). Prey animals recorded in young forests included bank vole, greater white-toothed shrew and several passerine species of bird (McCarthy *et al.,* 2019). However, prey abundance in young forestry may be less than in open moorland, the more traditional habitat utilised by Hen Harrier in many places. Nonetheless, a negative trend in the extent of potential forest foraging resource is expected for the Slieve Felim to Silvermines Mountains SPA, where the extent of useable forest is predicted to drop from 23% in 2012 to 11% in 2025.
Significance of the Impact: Significant (negative)
Rationale for Impact Evaluation: • Precautionary basis
Activity: Agriculture
Impact Magnitude: Agricultural activities have the potential to adversely affect the availability of Hen Harrier prey items through land improvement, increases in stocking levels and various management techniques. Pathways which are specifically agriculturally based activities may result in habitat loss, habitat fragmentation and habitat degradation due to intensification or abandonment. Grazing is a means of maintaining open habitats for Hen Harrier and changes to grazing regimes can alter the availability of suitable habitat, by affecting prey item densities. An EIP (European Innovation Partnership) Locally Led Scheme called the Hen Harrier Project is in place across 6 SPA's in Ireland including the Slievefelim to Silvermine Mountains SPA which facilitates the reward of farmers whose land holding is within or adjacent to the SPA for maintaining suitable Hen Harrier habitat. No changes to the current (baseline) management of the grasslands immediately around the Mountphilips Substation site are planned to occur (EDL landowner consultation).
Significance of the Impact: Significant (negative)
Rationale for Impact Evaluation: • Precautionary Basis
Other Project: Turf-cutting
Impact Magnitude: Peat extraction by hand or through mechanical means is ranked as a medium level pressure in respect of Hen Harrier within the SPA. The removal of peat reduces the availability of habitat for ground nesting birds such as Meadow Pipit and Skylark, which are prey items for Hen Harrier. Within the Whole Project Cumulative Evaluation Study Area, turf extraction appears to form part of the current baseline environment at various locations such as Bleanbeg Bog, Cummermore, Gortmahonoge and at Cummer (Mulloghney). Some of these habitats where they overlap the SPA are further protected through the provision of NHA's such as at Bleanbeg Bog, Mauherslieve Bog, and Grageen Fen and Bog, wherein further turf cutting of intact areas is unlawful, or SAC's such as Keeper Hill SAC, Bolingbrook Hill SAC, Silvermine Mountains SAC or Silvermines Mountains West SAC wherein Conservation Objectives to protect Qualifying Interest bog habitats are set out.
Significance of the Impact: Neutral
Rationale for Impact Evaluation: • Restrictions on further turf cutting (and hence prey item habitat) in intact areas/protected areas, and; • The limited extent of lands subject to turbary (rights to cut turf) within the Hen Harrier SPA overall (4%), with little of this occurring within the CE Study Area; • The reversibility of any effect, (in the context of Hen Harrier) with birds expected to continue to utilize re-vegetating cutover bog for foraging.

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Evaluation of Other Cumulative Impacts – Reduction in Prey Item Species

Whole UWF Project Effect

Magnitude:
The potential for reductions in the abundance in Hen Harrier prey item species will occur across the Whole UWF Project area as a result of habitat loss (both temporary and permanent) and disturbance/displacement from construction works and construction stage activities. Overall, general mammal species such as Brown Rat, Shrews, Mice, Bank Vole, Hare and Rabbit and amphibians and reptiles are likely to be present in low densities and observable changes to existing trends as a result of the construction of the Whole UWF Project are not expected. Due to the abundance of suitable habitat for passerines in the immediate wider area, general passerine species and Meadow pipit will not be significantly affected. Given the very small extent of suitable foraging habitat for Hen Harrier at the Mountphilips Substation Site, and the lack of reliance on habitats at the Upperchurch Windfarm/UWF Related Works site and the separation of both locations from the nearest hen harrier nest (greater than 4km), the likely continued use of the UWF Replacement Forestry lands in early growth stage of the new woodland along with the low numbers of potential prey items lost due to operational landcover change, with additional species likely to be promoted through management, and the nature of the UWF Other Activities, the magnitude of the whole project impact is evaluated as no greater than the UWF Grid Connection alone, i.e. Negligible.

Significance of the Whole Project Effect: Moderate (Positive)

Rationale for Impact Evaluation:

- The extent of lands to be managed for Hen Harrier prey items;
- The very high sensitivity of the species and negligible magnitude, however;
- No noticeable changes in the character of the environment from a prey availability perspective are predicted.
- Distance from the only source (Mountphilips Substation site) of a reduction in Prey Items to the nearest hen harrier nest (greater than 4km);
- The reversibility of the effect on temporary land cover change areas following the completion of construction and reinstatement works, and the completion of activities; and
- UWF Replacement Forestry lands will remain available to prey item species following planting works until the new trees start to establish.

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

Both positive and negative quality effects occur with regard to Hen Harrier foraging habitat loss across the Whole UWF Project. The magnitude of any reduction in prey availability resulting from the Whole UWF Project, consented Castlewaller Wind Farm (including its potential grid connection), potential Bunkimalta Windfarm (including its consented grid connection), and turf cutting in the vicinity are evaluated as cumulative negligible due to the abundance of suitable habitat for prey item species in the immediate and wider upland area. Existing Milestone Windfarm is evaluated as neutral with the current management of lands for the benefit of hen harrier. Agricultural practices in the vicinity of works generally provide open habitats for hen harrier. Forestry activities in the surrounding area is generally a negative trend in the background environment currently with declines in available foraging habitat in the short-medium term (next 10 years & expected to increase subsequently and evaluated as significant in that regard. Overall the cumulative magnitude of the Whole UWF Project (during its construction) together with the Other Projects and Activities is evaluated as Negligible.

Significance of the Cumulative Impact: Neutral

Rationale for Cumulative Impact Evaluation:

- The very high sensitivity of the species and negligible magnitude;
- The availability of suitable habitat in the upland area;
- The net gain in terms of lands managed specifically for the use of Hen Harrier, and;
- Extent of lands to be managed in total, notwithstanding;

The medium-term duration of negative trend in respect of reductions in forestry based foraging habitat;

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Distance to Nests from the various lands which will undergo management.

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8.6.4.5 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-52 below.

Table 8-52: Description and Rationale for Excluded Impacts to Hen Harrier

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

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage/Planting Stage				
Land cover change	1,2,3,4	Land cover	Reduction in or Loss of Suitable Nesting Habitat or Winter Roosting Habitat	Evaluated as Excluded: No potential for effect: Habitat surveys for the Whole UWF Project show that there is no suitable nesting habitat (i.e. suitable bog, pre-thicket forestry) or winter roosting habitat (i.e. suitable bog, scrub, or reedbeds) overlapping the construction works area for UWF Grid Connection, UWF Related Works, UWF Replacement Forestry or Upperchurch Windfarm.
Forestry Felling, tree felling, vegetation clearance, movement of machinery	1,2,3,4	Contact	Mortality of Hen Harrier in or at Nest Sites or Roost Sites	Evaluated as Excluded: No likely effect on nests sites, as breeding nest sites are located outside the construction works areas at distances greater than 0.6km from UWF Grid Connection, 4.5km from UWF Related Works, 5.3km from Upperchurch Windfarm, 6.8km from UWF Replacement Forestry. No likely effect on winter roosts sites as roosts are located outside the construction works areas at distances greater than 2km from UWF Grid Connection, 4.5km from UWF Related Works, 5.6km from Upperchurch Windfarm, 6km from UWF Replacement Forestry. Design measures are included as part of Project Design (for UWF Grid Connection, UWF Related Works and UWF Replacement Forestry) and as part of planning conditions for Upperchurch Windfarm which will avoid works during the breeding season in close proximity to nest sites. Project Design for UWF Grid Connection and UWF Related Works will also prevent mortality of roosting Hen Harrier outside of the breeding season.

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Noise and human activity	1,2,3,4	Visibility	Disturbance/Displacement of Nesting or Roosting Hen Harrier	Evaluated as Excluded: No likely effect on nests sites, as breeding nest sites are located outside the construction works areas at distances greater than 0.6km from UWF Grid Connection, 4.5km from UWF Related Works, 5.3km from Upperchurch Windfarm, 6.8km from UWF Replacement Forestry. No likely effect on winter roosts which are located outside the construction works areas at distances greater than 2km from UWF Grid Connection, 4.5km from UWF Related Works, 5.6km from Upperchurch Windfarm, 6.8km from UWF Replacement Forestry. Design measures are included as part of Project Design (for UWF Grid Connection, UWF Related Works and UWF Replacement Forestry) and as part of planning conditions for Upperchurch Windfarm which will avoid works during the breeding season in close proximity to nest sites, which will therefore avoid disturbance or displacement effects to nesting Hen Harrier. Project Design for UWF Grid Connection and UWF Related Works will also prevent disturbance or displacement of roosting Hen Harrier outside of the breeding season, with works limited to the period between one hour after sunrise to one hour before sunset during the months of October to February inclusive within 1km of a roost, as part of Project Design.
Operational Stage/ Growth Stage				
New above ground structures, new access roads	1,2,3,4	collision, physical contact	Additive mortality	Evaluated as Excluded: No likely impact: UWF Grid Connection: no likely impact with the new structures at Mountphilips Substation due to the immobility of these structures, all other parts are either underground or at ground level (i.e. new roads). UWF Related Works: no likely impact with the Telecom Relay Pole, due to the immobility of this structure and no precedent in the literature for this structure as a collision risk (akin to telegraph pole). UWF Replacement Forestry: no potential for effects due to the absence of moving structures. Upperchurch Windfarm: As per the 2014 ABP Inspectors Report no significant residual impact to Hen Harrier is expected to occur. There would be no potential for cumulative impacts with Other Elements, as the Other Elements are not likely to cause additive mortality of Hen Harrier. There is no risk of additive mortality due increased accessibility, as there will be no increase in accessibility - all new roads will have gates which will be locked on landholder boundaries and at site entrances.
Noise and human activity	1,2,3,4,5	Air and Visibility	Disturb-ance/displacement	Evaluated as Excluded: Neutral effect Distance to established nests and winter roosts and low frequency of occurrence during the winter months reduces

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
			to nesting or roosting Hen Harrier	likelihood of effect to winter foraging birds. Disturbance, if any, will be brief to momentary in duration, combined with low frequency of operational maintenance and high reversibility once any commuting (i.e. a hen harrier moving towards or from a nest or night roost location) bird moves beyond 150m from source of disturbance means that effects, if any, will be Neutral.
Noise and human activity	1,2,3,4,5	Air and Visibility	Disturb-ance/displacement to foraging Hen Harrier (breeding and non-breeding)	Evaluated as Excluded: No potential for impacts/Neutral effects; UWF Grid Connection: - Operational activities mainly relate to the Mountphilips Substation compound area at the Mountphilips Substation site. The compound is >4km from the nearest known nest. Hen Harriers are central place foragers, with much of foraging occurring within 2km of the nest. Therefore, it is considered that based on distance, disturbance or displacement effects during either breeding or non-breeding due to activities at the Mountphilips Substation site are not likely to occur. Along the 110kV UGC, operational activities will involve annual testing and inspection, with these activities being carried out entirely from road pavements. No disturbance/displacement expected beyond 150m from activity locations, no nests were recorded closer than 600m from the 110kV UGC during 2016 to 2019 surveys. In addition, annual inspection and any planned maintenance along the 110kV UGC will be scheduled to occur outside of the breeding season, which will avoid disturbance of breeding Hen Harrier. Any unscheduled repair work, which may need to take place during the breeding season, will occur very infrequently, if at all. Due to the likely separation distance from nests, and the infrequent, reversible, and temporary duration of works, and location of any works within existing roads, it is considered that disturbance/displacement effects to hen harriers will be Neutral during unplanned repairs, should they occur at all. Effects outside breeding season are anticipated to be less, as birds will be ranging widely through the countryside and densities are low. UWF Related Works – operational activities will involve inspection and some maintenance of Realigned Windfarm Roads and of the Telecom Relay Pole, with annual visual walkover inspections of the ground above Internal Windfarm Cabling, all of which will be of very brief duration. Some of the Haul Route Works locations may also be required to be used during any turbine blade replacements. Habitat surveys of lands within 150m of the UWF Related Works (150m is considered to be the distance from the disturbance/displacement where impacts on foraging Hen Harrier could occur) indicate that there is potentially 152ha (27%) of suitable foraging habitats where Hen Harriers could be disturbed. However, this forms a very small proportion of

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				the available suitable foraging habitat in the wider landscape. A similar calculation on habitat availability within 2km of the UWF Related Works indicates that there are some 2,050 ha (38%) of suitable habitats within 2km and, according to Moran & Wilson-Parr (2015), there is 70% suitable habitat within the SPA as a whole. We therefore evaluate that there is no likelihood of wintering or breeding Hen Harrier depending on the habitats within 150m of the UWF Related Works during the operational phase due to the overall extent of habitat availability. UWF Replacement Forestry: Evaluated as Excluded: All works will be done by hand and equivalent to typical farming activities, therefore the magnitude of any noise or visual intrusion will be Negligible and any disturbance or displacement effects are likely to be Neutral. Upperchurch Windfarm: As per the 2014 ABP Inspectors Report, with the implementation of the Upperchurch Hen Harrier Scheme, no significant residual impact to Hen Harrier is expected to occur. UWF Other Activities: Evaluated as Excluded: Element 4: HA1-HA20. These are excluded from further evaluation as works involve street furniture removal or activities on public roads with no significant source of noise or intrusion.
Electrical parts	1,2,4	Air	Exposure to EMF	Evaluated as Excluded: No likely effects, as literature (http://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-Evidence-Based-Environmental-Study-5-Birds.pdf) supports no precedent for this as a viable impact.
Decommissioning Stage				
Noise and human activity	5 (HA1-HA20)	Visibility	Disturb-ance /displace ment	Evaluated as Excluded: No impact/ Neutral Impact UWF Grid Connection – no decommissioning related impacts – as the UWF Grid Connection will not be decommissioned UWF Replacement Forestry – no felling related impacts – UWF Replacement Forestry will be a permanent wood and will not be felled. Upperchurch Windfarm and UWF Related Works- Neutral impact: decommissioning works will take place from hardcore areas, small number of machines required and brief duration of works (2 to 3 days) at each turbine location. No likely effect on nests sites, as breeding nest sites are located outside the footprints of the Upperchurch Windfarm/UWF Related Works at distances greater than 4.5km from UWF Related Work and 5.3km from Upperchurch Windfarm UWF Other Activities: Haul Route Activities: Neutral effect as works involve street furniture removal or activities on public roads with limited sources of noise or intrusion. No requirement for activities associated with the remaining UWF Other Activities.

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8.6.5 Mitigation Measures for Impacts to Hen Harrier

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

8.6.6 Evaluation of Residual Impacts to Hen Harrier

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table for Hen Harrier above (Section 8.6.4) – i.e. **no significant adverse impacts**.

8.6.7 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 a Invasive Species Specialist.

All surveys for breeding or roosting Hen Harrier, and monitoring of temporal restrictions of works in relation to nesting or roosting Hen Harrier will be undertaken by a suitably qualified Ornithologist(s) (and member of CIEEM) with experience in the survey and management of Hen Harrier.

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8.6.8 Summary of Impacts to Hen Harrier

A summary of the Impact to Hen Harrier is presented in Table 8-53.

Table 8-53: Summary of the impacts to Hen Harrier

Impact to Hen Harrier:	**Permanent or Temporary Reduction in or Loss of Suitable Foraging Habitat**	**Disturbance/ displacement of foraging Hen Harrier during the breeding season**	**Disturbance/Displacement of foraging Hen Harrier outside of the breeding season**	**Reduction in Prey Item Species**
Evaluation Impact Table	*Section 8.6.4.1*	*Section 8.6.4.2*	*Section 8.6.4.3*	*Section 8.6.4.4*
Project Life-Cycle Stage	Construction/ Operation	Construction	Construction	Construction /Operational
UWF Grid Connection *Direct/indirect impact*	**Not Significant**	**Not Significant**	**Not Significant**	**Imperceptible**
UWF Grid Connection *Cumulative impacts*	**Not Significant**	**Not Significant**	**Not Significant**	**Imperceptible**
Element 2: UWF Related Works	Not Significant	No Impact	Not Significant	Not Significant
Element 3: UWF Replacement Forestry	**Very Significant (positive)**	Neutral to Not Significant	Not Significant	**Moderate (positive)**
Element 4: Upperchurch Windfarm	Neutral residual effect	Not Significant	Not Significant	Neutral
Element 5: UWF Other Activities	**Very significant (positive)**	Not Significant	Not Significant	**Very Significant (positive)**
Cumulative Impact:				
All Elements of the Whole UWF Project	**Significant (positive)**	Not Significant	Not Significant	**Moderate (positive)**
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities: Bunkimalta Windfarm Castlewaller Windfarm Forestry, Agriculture, Turf-Cutting in the area Quarrying	Neutral	Not Significant to Slight (negative)	Not Significant	Neutral

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

8.7 Sensitive Aspect No.6: General Bird Species

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

Dr. Alex Copland, Chris Cullen and Howard Williams were the main authors of this Section. Please see Sources of Informaiton (Section 8.1.7) and Methodology (Section 8.1.8) for details of the desktop and fieldwork surveys which have informed the evaluation of General Birds.

8.7.1 BASELINE CHARACTERISTICS of General Bird Species

8.7.1.1 STUDY AREA for General Bird Species

The study area for General Bird Species in relation to the UWF Grid Connection is described in Table 8-54 and illustrated on Figure GC 8.7: UWF Grid Connection Study Area for General Bird Species (Overview and Maps 1 to 4) (Volume C3 EIAR Figures).

Table 8-54: UWF Grid Connection Study Area for General Bird Species

Study Area for General Bird Species	Justification for the Study Area Extents
100m area around and incorporating the construction works areas- species numbers and density 50m area around and incorporating the construction works areas -habitat suitability evaluations 50m area around and incorporating the construction works areas -Barn Owl Building Suitability 300m area around and incorporating the construction works areas- Kingfisher Watercourse Crossing Locations -Grey Wagtail and Dipper	Professional judgement and as per Best Practice (BWI, 2012; CIEEM, 2016; NRA, 2008; Lusby *et al*., 2010; SNH 2014; TII, 2017; EPA, 2006)

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

The receiving environment in the UWF Grid Connection Study Area supports a wide variety of general bird species of open countryside and farmland, in addition to more specialist upland species. Some migratory species are only present during the summer or winter months within which they disperse widely over suitable habitat, whilst other sedentary species are present throughout the year.

General Breeding Birds

A standardised bird transect survey was undertaken at the Mountphilips Substation site in the breeding season of 2016 and 2017 and a similar transect methodology was also used to survey whole length of the proposed 110kV UGC route in April 2019 (including again the lands at Mountphilips – covered under Transect T40).

The three breeding season surveys at the Mountphilips substation site recorded a total of 37 species, including one species, Meadow pipit that is Red-listed as a Bird of Conservation Concern in Ireland (BoCCI; Colhoun & Cummins, 2013). A further nine Amber-listed BoCCI species were recorded (Barn Swallow,

Goldcrest, Greenfinch, Linnet, Mistle Thrush, Robin, Starling, Skylark and Stonechat). Although breeding status was not confirmed during this survey effort it is likely that all these species could potentially breed within the vicinity of the Mountphilips substation due to the presence of suitable habitats.

In the April 2019 survey along the entire length of the proposed 110kV UGC route, a total of 50 bird species were recorded and although breeding for all species was not confirmed, it is likely that 49 species could possibly be breeding in the vicinity of the route (the exception being a casual record of Lesser Black-backed Gull during surveys – a species which breeds on coasts or large inland waterbodies in Ireland, and were likely to have been recorded on passage through the survey area). During the April 2019 transect survey along the proposed 110kV UGC route, two bird species that are Red-listed as Birds of High Conservation Concern in Ireland (Colhoun & Cummins, 2013) were recorded: Grey Wagtail and Meadow Pipit. In addition, 16 Amber-listed Birds of Conservation Concern in Ireland (Colhoun & Cummins, 2013) were also recorded (Dunnock, Goldcrest, Greenfinch, House Sparrow, Linnet, Mistle Thrush, Robin, Skylark, Stonechat, Barn Swallow, Sparrowhawk, Sand Martin, House Martin, Kestrel, Lesser Black-backed Gull and Starling).

The species recorded during the surveys at Mountphilips Substation site and along the route of the 110kV UGC are all representative of common and widespread terrestrial breeding bird communities in Ireland, being typical of the mosaic of farmland, woodland and rural gardens found in the survey areas.

The full list of species is included see Section 8.7.2.1 - 110kV UGC and Section 8.7.2.4 – Mountphilips Substation Site in Appendix 8.7: General Birds Fieldwork & Survey Results.

No species on Annex I of the EU Birds Directive were recorded during any of these surveys.

During Hen Harrier vantage point surveys during the non-breeding season 2017/2018 two bird species that are Red-listed as Birds of High Conservation Concern in Ireland (Colhoun & Cummins, 2013) were recorded: Golden Plover and Meadow Pipit. In addition, 3 Amber-listed Birds of Conservation Concern in Ireland (Colhoun & Cummins, 2013) were also recorded (Snipe, Sparrowhawk, and Kestrel).

General Wintering Birds

A repeat of the breeding bird survey at the Mountphilips substation was undertaken in the winters (November-February) of 2016-17 and 2017-18. For these surveys, a total of 25 species were recorded in the vicinity of the Mountphilips substation during transect surveys in the winter of 2016-17 and 2017-18. As with summer, Meadow Pipit was the only BoCCI Red-listed species recorded, along with five BoCCI Amber-listed species (Snipe, Goldcrest, Starling, Robin and House Sparrow).

Based on the range of terrestrial habitats mapped and based on observations made during these surveys of the Mountphilips Substation site and the 110kV UGC route, the general wintering bird community is typical of common and widespread bird communities found in the wider countryside in Ireland.

Meadow Pipit

Terrestrial habitat surveys indicate that Meadow Pipit habitat is widespread along the proposed 110kV UGC route. A total of 98 Meadow Pipits were recorded along the 110kV UGC route in April 2019 and breeding in the fields adjacent to the survey transect is therefore likely. A maximum of two birds were recorded in the vicinity of the Mountphilips Substation site in the 2017 breeding season. Meadow Pipit have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation.

This species is generally site-faithful, although there is some post-breeding dispersal in winter months, particularly from upland areas to lowland habitats.

Golden Plover breed in heather moors, blanket bogs and acidic grasslands and disperse widely over the winter months. Wintering Golden Plover use wide open expanses of pasture and tilled land. No suitable

breeding habitat for Golden Plover was recorded within the survey area, during the survey undertaken in January 2019. However, suitable winter habitat for Golden Plover, consisting of pasture in large open fields was recorded. This species was not observed during ecological surveys in January 2019 or the transect survey in April 2019. Golden Plover have been assigned a sensitivity rating of High for evaluation.

Kingfisher

Kingfisher are on Annex I of the EU Birds Directive and Amber-listed in Ireland as a species of Conservation Concern (Colhoun & Cummins, 2013). With regard to the proposed UWF Grid Connection suitable watercourses were surveyed 300m upstream and downstream of suitable watercourses at crossing locations. These surveyed watercourses include the Newport River (W7), Clare River (W36) and Bilboa River (53) and 23 other watercourses (W5, W8, W9, W18, W21, W22, W23, W26, W28, W29, W30, W33, W35, W39, W41, W42, W46, W47, W48, W49, W50, W51 and W52). Habitats at watercourse crossings are generally unsuitable for nesting Kingfisher, which requires sandy or earth banks alongside the watercourse to establish their tunnel/burrow nests.

For the Newport River, the survey area extended to 500m upstream and downstream of the crossing point W7 (NRA, 2008). A Kingfisher nest was found c.540m upstream in a sandy bank. However, suitable Kingfisher habitat was only present from c.400m upstream and further upstream past the nest location. The watercourse downstream from this (i.e. from 400m upstream of the crossing point to 500m downstream) was typically shallow and fast-flowing with many in-stream boulders and riffles or small waterfalls. These riverine habitats are not utilised by Kingfisher for foraging, which prefer slow-flowing waterways for feeding; (Snow & Perrins, 1998). It is therefore likely that Kingfisher foraging from the nest is from c.400m upstream from the crossing point (W7) and further upstream from this. An Earth bank with Kingfisher nesting potential; but no nest hole present; was noted 430m upstream, a Kingfisher was sighted at 450m upstream and a nest hole was recorded in the riverbank at 540m upstream.

Dipper

Dippers are a widespread resident along rocky streams and rivers and are slightly smaller than a blackbird. Dippers breed along fast flowing streams and rivers with plenty of exposed rocks. In Ireland, the majority of breeding pairs are found in uplands. A single Dipper was also observed during the transect survey in April 2019. Dipper nests were recorded at three water crossing locations; one nest at watercourse crossing W18, two nests at watercourse crossing W28 and one nest at watercourse crossing W41. One other water crossing (W23) was identified as suitable for Dipper; however, no evidence of Dipper was recorded at this location.

Grey Wagtail

During ecological surveys undertaken of the 110kV UGC route in January 2019, observations of evidence of Grey Wagtail at water crossings were recorded and a probable Grey Wagtail nest was recorded at watercourse crossing W36. A total of 11 Grey Wagtail were recorded during the April 2019 transect along the proposed 110kV UGC, and there are suitable habitats for breeding Grey Wagtail at or close by to watercourse crossing locations.

Barn Owl

There are no buildings within the survey area at the Mountphilips Substation site.

All buildings within the survey area along the route of the 110kV UGC were evaluated for suitability for Barn Owl during the ecological surveys undertaken in January 2019. The assessment followed criteria according to TII (2017).

Four buildings where assessed as having high suitability for Barn Owl. These were all surveyed in August 2019 for occupancy. No signs of occupancy were detected for any of these buildings. One building was too

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dangerous to enter due to the state of repair. The owner stated that he had occasionally observed Barn Owls during the winter but did not believe that they were breeding at that location.

No suitable breeding habitat for Red Grouse was recorded during the ecological surveys of the proposed UWF Grid Connection in January 2019. In the winter if snow is on the ground the species has a widespread distribution occupying wind swept ridges and lower ground, however no suitable habitat with sufficient habitat cover was recorded within the survey areas and no birds were recorded during any of the ecological surveys in the area..

Eurasian Curlew (Curlew) nest on the ground in a range of habitats in Ireland, from rough pasture, meadows and heather. Huge changes in the upland areas, such as the destruction of peat bogs, afforestation, intensive management of farmland and the abandonment of some lands, leading to encroachment by scrub, gorse and dense rushes, have all affected Curlew breeding habitats. In Ireland, the Curlew is not a common breeder, however it is found in most parts of the country. No suitable habitat for wintering Curlew were recorded during the ecological survey of the proposed 110kV UGC route in January 2019 and no Curlew were observed during any of the other the ecological surveys, including the transect survey along the proposed 110kV UGC route in April 2019. No suitable breeding habitat for Curlew was recorded within the study area during these surveys. In general, grazing regimes and other land management practices within 50m of the road corridor and at the Mountphilips Substation site preclude breeding by this species.

No suitable breeding habitat for Merlin or Peregrine were recorded within the study area during the ecological surveys undertaken in January 2019 (the proximity to the road qualifies the habitats as unsuitable for breeding for Merlin; whilst for Peregrine there are no suitable nesting habitats (large buildings, cliff faces or quarries)). During the winter both species have a widespread distribution, and Merlin may occasionally perch in roadside trees during the winter months. However, the locations of works do not comprise foraging habitat for these species.

Further details on General Bird fieldwork and survey results are included in Appendix 8.7: General Birds Fieldwork & Survey Results.

8.7.1.3 Importance of General Bird Species

All wild bird species are protected by legislation under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000. Merlin, Peregrine Falcon, Golden Plover and Kingfisher are listed on Annex I of the EU Birds Directive 2009/147/EC. Eurasian Curlew is now classified on the IUCN Red List as 'near threatened'.

Notwithstanding the protection afforded to some bird species at EU level, the importance of each species in relation to the UWF Grid Connection area takes account of international classifications and the occurrence of the species at the site within the context of resident or regularly occurring local populations, county populations or those at a national or international level – see Table 8-3 for criteria.

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

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

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

Listed on the IUCN (global) Red List of Conservation Concern, as well as the Red List of the Birds of Conservation Concern in Ireland, Eurasian Curlew is evaluated as of National Importance and assigned a sensitivity rating of **High**.

Kingfishers are on Annex I of the EU Birds Directive and are Amber listed in Ireland, due to having an unfavourable conservation status in Europe from historical declines. However, Kingfisher populations are not of global concern, thus a sensitivity rating of **Low** is applied.

Dipper are Green-listed in Ireland, and due to their widespread population in Ireland are assigned a sensitivity rating of **Negligible**.

Grey Wagtail are Red-listed in Ireland due to short-term population declines. With a recovering Irish population, and a secure European and global population, a sensitivity rating of **Low** is applied.

Barn Owl, are Red-listed in Ireland due to short- and long-term population declines. Barn Owl are assigned a sensitivity rating of **High.**

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

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

8.7.1.4 Sensitivity of General Bird Species

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

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

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

Red Grouse are sensitive to habitat loss and fragmentation from afforestation and agricultural land-use change, including over-grazing. Recreational disturbance may also be an issue in some upland areas, as can unsustainable or illegal hunting. Poor management of heather, including illegal burning and wildfires, and ground predators can negatively impact nesting birds during spring and summer months.

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

Kingfishers are known be particularly sensitive to disturbance at their nests, although can tolerate disturbance in the vicinity (e.g. on the bank or within the watercourse) provided that the actual nest is not interfered with. Water quality issues, such as nutrification from agricultural run-off or point-source pollution, may also impact on prey availability and water clarity (Kingfishers hunt by observing prey within the water).

Dipper and other species such as Grey Wagtail which associate with freshwater are sensitive to secondary water quality degradation, including nutrification from agricultural run-off or point source pollution and acidification of the water (which is linked to commercial forestry harvesting operations). These may alter prey assemblages which in turn can impact upon breeding success. Such riverine birds may also be impacted by severe weather events, such as localised flooding (which can wash away nests) or very cold snaps during the winter (which limits prey availability).

Barn Owl are well studied in Ireland and face a number of threats. Loss of nesting sites and prey-rich foraging habitats is likely to be one of the main issues, as well as the ingestion of second-generation rodenticides that such prey may have consumed. These can build up within the tissues of the Barn Owl to lethal levels. Barn Owls are also susceptible to road mortality, particularly from hunting along embankments and verges of motorways and other major roads.

Merlin are sensitive to habitat loss, particularly the intensification of agriculture in upland areas which may impact on prey-rich foraging habitats. The impact of upland afforestation are less clear, as Merlin have adapted to nest in such forested landscapes, although it seems likely that such landscapes reduce the density and availability of prey. Merlin are also sensitive to disturbance during the breeding season.

Peregrine remain sensitive to persecution at breeding sites, with several cases of illegal killing reported annually. They are also susceptible to secondary poisoning through the food chain (although this appears to be less of an issue now since the ban (and reduction in use) of certain chemicals).

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

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

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

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

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

8.7.1.6 Receiving Environment (the Baseline + Trends)

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

8.7.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.7.2.1 Cumulative Evaluation Study Areas

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

The study is illustrated on Figure CE 8.7: UWF Grid Connection Cumulative Evaluation Study Area for General Bird Species.

8.7.2.1.2 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.

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 8.7.2.2.1 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 8-55 and illustrated on Figure WP 8.7: Whole Project Study Area for General Bird Species (Overview and Map 1) (Volume C3 EIAR Figures).

Table 8-55: Whole Project Cumulative Evaluation Study Area for General Bird Species

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

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

The evaluation of cumulative impacts to General Bird Species also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to General Bird Species with either the UWF 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 Cumulative Evaluations (Section A2.1.4.9).

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

8.7.2.2.1 Potential for Impacts to General Bird Species

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect General Bird Species. The results of this evaluation are included in Table 8-56.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 8.7. The baseline character of the areas around these Elements is described in Section 8.7.2.3.

Table 8-56: Results of the Evaluation of the Other Elements of the Whole UWF Project

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

8.7.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.7.2.3.1 Element 2: UWF Related Works

All the species recorded within 50m of the UWF Related Works construction works areas are typical of the habitats present.

General Breeding Birds

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

present. Many of the remaining species are typically representative of the land use present and have strong associations with the type of activities in the area (e.g. hill farming) in respect of the quality of habitat present. Studies as part of the current evaluation of UWF Related Works, such as habitat surveys for UWF Replacement Forestry (conducted in April 2017), also recorded species such as Blackbird, Goldcrest, Great Tit, Wren and Robin, in addition to Meadow Pipit, Reed Bunting and Skylark. In general, the distribution of general bird species is considered unchanged with respect to the passage of time since the 2013 EIS.

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

General Wintering Birds

Studies for the 2013 EIS on Upperchurch Windfarm (which overlaps the locations of UWF Related Works) recorded a typical assemblage of wintering species (n=34). Of these five Amber-listed (Skylark, Hen Harrier, Kestrel, Starling and Linnet) and 29 Green-listed species were present. In the interest of clarity, we note that the BoCCI status presented herein is the more current Cummins and Colhoun (2013) evaluation, published subsequent to the Upperchurch Windfarm EIS.

Meadow Pipit

This is a very widespread species in Ireland, found in bogs, uplands and areas of scrub and pasture, with an estimated population of 500,000 to 1,000,000 pairs. Birds are ground nesting and typically feed on invertebrates such as crane flies, mayflies and spiders. This species nests on the ground in open countryside in heaths, moors, bogs and coastal marshes. This species is generally site-faithful, although there is some post-breeding dispersal in winter months, particularly from upland areas to lowland habitats. There is c.123Ha of suitable habitat, comprising grassland, grassland mosaics, dry heath, upland blanket bog and cutaway bog, for Meadow Pipit within the UWF Related Works Study Area. It is considered that the habitat at UWF Related Works is sub-optimal/optimal, and it is noted that suitable habitat occurs throughout the wider area. Meadow Pipit were recorded on the UWF Related Works sites during bird surveys for Upperchurch Windfarm and during site surveys for UWF Related Works.

Golden Plover

Golden Plover breed in heather moors, blanket bogs & acidic grasslands. Golden Plover form flocks in winter, foraging and roosting in large open pasture and tilled fields. Golden Plover were not recorded from the locations of the UWF Related Works during any site visits and none were observed during studies to inform Upperchurch Windfarm 2013 EIS. There is c.120ha of available suitable Golden Plover habitat within the study area which mainly comprises improved agricultural grassland and grassland mosaics, and small areas of upland blanket bog and cutaway bog. The habitat is only suitable for wintering birds.

Red Grouse

The Red Grouse is a sub-species of Willow Grouse. It is resident in the west and north of Britain and in Ireland. In Ireland, it is a widespread but sparely-occurring breeding bird. It is found on mountains, moorland and lowland blanket bogs and raised bogs, where it is associated with heather which it requires for food, shelter and nesting. Optimal habitat for Red Grouse is not found within the locations of the UWF Related Works. No Red Grouse were recorded in studies to inform Upperchurch Windfarm. Although Upland Blanket Bog is present within the 50m habitat survey buffer it is sub-optimal for the species, and no evidence was recorded during e.g. habitat walkovers and surveys.

Merlin, Peregrine Falcon

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

General Bird Species

Sensitive Aspect

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

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

Eurasian Curlew

Curlew was not recorded from the locations of the UWF Related Works during any site visits and none were observed during studies to inform the (overlapping) Upperchurch Windfarm EIS. Areas of wet grassland and open moorland are present in the wider area, but may be sub-optimal for Curlew due to land use management, and fragmentation.

Kingfisher

Kingfishers breed in tunnels dug in vertical banks along watercourses. They are a largely sedentary species and rarely move from established territories. However, some may move to lakes and coasts during extended spells of cold weather outside of the breeding season. They are widespread in Ireland and found on streams, rivers and canals. Kingfisher was not recorded during studies to inform Upperchurch Windfarm EIS. None were recorded in surveys to inform the current appraisal, including watercourse evaluations. The watercourses (habitats) which are present on the UWF Related Works site predominately comprise drains which are not suitable for breeding Kingfisher.

8.7.2.3.2 Element 3: UWF Replacement Forestry

General Birds

Species recorded on site (during habitat surveys) included Wren, Robin, Meadow Pipit, House Martin, Blackbird, Stonechat, Hooded Crow, Chaffinch, Rook, Magpie and Woodpigeon.

General Wintering Birds

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

Meadow Pipit

Meadow Pipits are present and were recorded at the UWF Replacement Forestry site.

Golden Plover

Golden Plover were not recorded from the locations of the UWF Replacement Forestry during any site visits and none were observed during studies to inform the adjacent Upperchurch Windfarm 2013 EIS.

Red Grouse

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

Merlin

Merlin was not recorded from the locations of the UWF Replacement Forestry during any site visits and none were observed during studies to inform the adjacent Upperchurch Windfarm 2013 EIS. No breeding habitat is present.

Biodiversity

Topic

Eurasian Curlew

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

Kingfisher

Kingfisher was not recorded during any site visits to inform the 2018 evaluation for UWF Replacement Forestry. Kingfisher was not recorded during studies to inform the adjacent Upperchurch Windfarm EIS. The watercourse which is present within the landholding is not suitable for nesting Kingfisher.

8.7.2.3.3 Element 4: Upperchurch Windfarm

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

General Breeding Birds

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

General Wintering Birds

Studies on Upperchurch Windfarm (2013) recorded a typical assemblage of wintering species (n=34). Of these five Amber-listed (Skylark, Hen Harrier, Kestrel, Starling, and Linnet) and 29 Green-listed species were present. In the interest of clarity we note that the BOCCI status presented herein is the more current Cummins and Colhoun (2013) evaluation, published subsequent to the Upperchurch Windfarm EIS.

Meadow Pipit

Meadow Pipit is present in suitable habitat.

Golden Plover

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

Red Grouse

No Red Grouse were recorded in studies on Upperchurch Windfarm.

Merlin

Merlin was not observed during studies on Upperchurch Windfarm.

Eurasian Curlew

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

Kingfisher

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

Consideration of the Passage of Time: The makeup of suitable habitat for general bird species on the Upperchurch Windfarm site has not materially changed since 2012/2013, and the species recorded during the 2012/2013 surveys were generally also recorded during site surveys for UWF Related Works. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this 2019 EIAR for UWF Grid Connection.

8.7.2.3.4 Element 5: UWF Other Activities

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

Bird species present during a site walkover (January 2018) of Overhead Line Activities locations were recorded. In total, twenty three species were recorded, including six Amber-listed species (Goldcrest, Stonechat, Starling, Common Snipe, Robin and House Sparrow), the remaining species were green listed. See Appendix 8.7: General Birds Fieldwork & Survey Results, Section A8.7.2.5.

8.7.2.3.5 Other Projects or Activities

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

8.7.3 PROJECT DESIGN MEASURES for General Bird Species

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

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

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

The Project Design Measures outlined in Table 8-57 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **General Bird Species**.

Table 8-57: UWF Grid Connection Project Design Measures relevant to General Bird Species

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).
PD58	Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season i.e. not during the period of March to August inclusive. This includes hedgerow and scrub removal in addition to hedgerow trimming.
PD59	Works will not take place at any bridge during the Dipper breeding season (Feb-June inclusive) without a confirmatory survey to determine Dipper presence or absence. If Dippers are present, where possible works will not proceed until breeding has completed. All works at these and other bridges will be overseen by a project ecologist to ensure the requirements of the Wildlife Acts are being met. During culvert replacement works at W13, a Dipper nest box will be fitted to the new crossing structure. Additional nest boxes (c.10) will be provided for Dipper at suitable bridges to provide a net gain for this species.
PD60	Where works will be carried out at parapet walls, no works will take place between the period April-August without confirmatory survey as to the presence or absence of breeding Grey Wagtail. If breeding Grey Wagtail is present, then works will be overseen by a suitably qualified ecologist to ensure no effects occur to Grey Wagtail present in adherence to the requirements of the Wildlife Act. Works at all bridges will be overseen by the project Ecologist. Nest boxes (c.10) will be provided for Grey Wagtail at suitable bridges to provide a net gain for this species.
PD62	All bridges/structures where works are proposed will be subject to confirmatory surveys for General breeding birds prior to works commencing. All works will be supervised by the project Ecologist.

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

8.7.4 EVALUATION OF IMPACTS to General Bird Species

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

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

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

Table 8-58: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Meadow Pipit: Habitat Loss (construction stage)	*Disturbance / Displacement: Meadow Pipit (construction stage)*
Golden Plover: Habitat Loss (construction stage)	*Habitat Loss – Merlin, Red Grouse, Eurasian Curlew, (construction stage)*
Golden Plover: Disturbance/Displacement (construction stage)	*Habitat Loss – Kingfisher, Grey Wagtail, Dipper (construction stage)*
Grey Wagtail, Kingfisher, Dipper: Disturbance /Displacement (construction stage)	*Disturbance / Displacement: General Birds, (construction stage)*
General Birds: Habitat Enhancement (operational stage)	*Disturbance / Displacement: Merlin (construction Stage)*
	Disturbance / Displacement:, Red Grouse, (Construction stage)
	Disturbance / Displacement: Eurasian Curlew, (construction stage)
	Disturbance / Displacement: Peregrine, (construction stage)
	Disturbance / Displacement: Barn Owl, (construction stage)
	Physical injury or destruction of nests/chicks, (construction stage)
	Disturbance / Displacement, (operational stage)
	Disturbance / Displacement, (decommissioning stage)

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 8.7.4.1 to 8.7.4.5.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 8.7.4.6.

8.7.4.1 Impact Evaluation Table: Meadow Pipit – Habitat Loss

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction Works; Excavation; Movement of Soils and Machinery
Cumulative Impact Source: Construction Works; Excavation; Movement of Soils and Machinery, Afforestation
Impact Pathway: Land Cover

Impact Description: The Meadow Pipit is a Red-listed species due to sharp breeding declines thought to be a result of the unusually severe winters of 2009/10 and 2010/11. Based on this it is assigned a medium sensitivity rating. However, numbers of Meadow Pipit have been increasing since 2012 (Crowe *et al*., 2017)[33]. Land cover change of suitable nesting habitat (improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog), where construction works areas overlap may cause reductions in breeding numbers, foraging success, increased exposure to predation through displacement to less viable feeding areas, and local population level declines.

Meadow Pipit will benefit from enhancement measures for Hen Harrier as part of the Upperchurch Hen Harrier Scheme (UWF Other Activities), wherein the management prescription has been specifically designed to benefit species such as Meadow Pipit, which are an important prey item for Hen Harrier.

Meadow Pipit territory size varies depending upon habitat availability, structure and prey availability. A large-scale study in Welsh mountain grassland (Seel & Walton, 1979) which studied a similar landscape to that found around the proposed UWF Grid Connection (i.e. marginal, upland agricultural grassland) estimated an average annual density of 48 pairs per km^2, with the average home range size of 2.18ha. This equates to an estimated foraging distance around a nest of just under 100m (assuming the nest is located within an area of uniformly suitable habitat for foraging).

Impact Quality: Negative and positive

Evaluation of the Subject Development Impact – Meadow Pipit: Habitat Loss

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

Suitable breeding habitat occurs at the Mountphilips Substation site. In total permanent loss of suitable breeding habitat will comprise 1.75Ha in total, the vast majority 1.7ha of which is improved agricultural grassland (GA1), with the remaining 0.05ha comprising wet grassland (GS4). Temporary land-use change during construction will comprise 0.2ha of improved agricultural grassland (GA1) in the area of the new End Masts. Given the very small extent of suitable habitat, the magnitude of habitat loss at the Mountphilips Substation site is considered Negligible.

No suitable habitat loss will occur along the 110kV UGC route, outside of the Mountphilips Substation site, due to its location entirely on paved surfaces.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The medium sensitivity of the species, based on conservation status, and;
- negligible loss of suitable nesting habitat;

[33] Citation: Crowe, O., Coombes, R.H., Tierney, T.D., Walsh, A.J. & O'Halloran, J. 2017. *Countryside Bird Survey Report 1998-2016*. BirdWatch Ireland, Wicklow

Topic: **Biodiversity**

Sensitive Aspect: **General Bird Species**

- The extent of suitable foraging habitat to be affected (1.75Ha), evaluated as very low, in the context of the availability of suitable habitat in the surrounding area.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: No cumulative effect will occur to Meadow Pipit habitat in combination with the Other Elements of the Whole UWF Project due to the separation distance of c.22km between the suitable habitat which will affected by land cover change for UWF Grid Connection (which occurs at the Mountphilips Substation area) and the land cover change associated with the Other Elements of the Whole UWF Project.

Significance of the Impact: No cumulative impact

Rationale for Impact Evaluation:

- Separation distance of c.22km between land cover change associated with UWF Grid Connection and the land cover change associated with any of the Other Elements.

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

Element 2: UWF Related Works

Impact Magnitude:
Construction Works will include land take of 0.2Ha of suitable breeding habitat for Meadow Pipit in the form of grassland and grassland mosaic. The scale of habitat loss is 0.15% of available habitat within the Study area boundary (123Ha – where suitable habitats for Meadow Pipit include grassland, grassland mosaics, dry heath, upland blanket bog and cutaway bog).

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The medium sensitivity of the species, based on conservation status, and;
- The extent of suitable habitat to be affected (0.2Ha), evaluated as negligible (<1% of available habitat lost), ;
- The long-term duration (15-60 years).

Element 3: UWF Replacement Forestry

Impact Magnitude:
Construction Works will include permanent land cover change of 3.98Ha of suitable breeding habitat (improved agricultural grassland (3.54ha) and wet grassland (0.44ha)) for Meadow Pipit. The scale of habitat loss represents 37% of available habitats (10.68Ha) within the UWF Replacement Forestry study area but is offset by the retention of suitable Meadow Pipit habitat within woodland rides to be established for foraging Hen Harrier.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The medium sensitivity of the species, based on conservation status, and;
- The majority of land cover change is from improved agricultural grassland, which is sub-optimal for Meadow Pipit, and;
- Offset by the retention of rides (i.e. Meadow Pipit habitat) within the deciduous woodland to be planted, notwithstanding;
- The extent of habitat subject to change, evaluated as high (20-80% of habitat lost), which;
- Comprises a major alteration to the baseline conditions;
- The permanent duration, and;
- Low reversibility with land cover change likely

Element 4: Upperchurch Windfarm
Impact Magnitude: Construction Works will include land cover change of 7.81Ha of suitable breeding habitat for Meadow Pipit in the form of grassland, grassland mosaic, and bog habitat. The scale of land cover change is 2.39% of available habitat within the Study area boundary (128Ha).
Significance of the Impact: Slight
Rationale for Impact Evaluation: • The medium sensitivity of the species, based on conservation status, and; • The extent of habitat to be lost, is low (i.e. 1-5% of available habitat),which; • Comprises a minor shift away from baseline conditions, notwithstanding; • The long-term duration (15-60 years), and; • Low reversibility with permanent land cover change likely
Element 5: UWF Other Activities
Impact Magnitude: The sensitive management of 128Ha of lands for Hen Harrier as part of the Upperchurch Hen Harrier Scheme will also increase the suitable habitat present for Meadow Pipit. No habitat loss of suitable breeding habitat is associated with other locations such as Haul route activities and Overhead Line Activities.
Significance of the Impact: Moderate (positive)
Rationale for Impact Evaluation: • The medium sensitivity of the species, based on conservation status, and; • The extent of lands to be sympathetically managed, evaluated as high (i.e. 20-80% of the 128Ha included in the Upperchurch Hen Harrier Scheme of habitat present), which; • Comprises a major alteration to baseline features, and • The long term duration, over the lifetime of the project, and; • Low reversibility.
Evaluation of Other Cumulative Impacts – Meadow Pipit: Habitat Loss
Whole UWF Project Effect
Magnitude: Instances of land cover change in respect of suitable breeding habitat will occur from works associated with the UWF Grid Connection (1.75Ha), UWF Related Works (0.2Ha), UWF Replacement Forestry (3.98Ha) and the Upperchurch Windfarm (7.81Ha). Overall habitat loss is 13.74ha, which is considered Negligible in the context of the size of the Whole UWF Project. No cumulative habitat loss effects will occur to Meadow Pipit as a result of UWF Grid Connection in combination with the other elements of the Whole UWF Project, as any land cover change associated within the UWF Grid Connection are outside the zone of effect for the other elements of the Whole UWF Project. No land cover change will occur within the Slieve Felim to Silvermines Mountain SPA (where either UWF Grid Connection or UWF Related Works overlaps the SPA). Outside the SPA, the sensitive management of 128Ha of lands for Hen Harrier as part of the Upperchurch Hen Harrier Scheme will also increase the suitable habitat present for Meadow Pipit.
Significance of the Whole Project Effect: Slight
Rationale for Impact Evaluation: • The medium sensitivity of the species, based on conservation status, and; • The Negligible magnitude of habitat loss overall (13.74Ha), comprises of a small extent of available habitat within 1km of the various works.

General Bird Species

Sensitive Aspect

- A very slight shift away from baseline conditions, which;
- Is ameliorated by the management of lands (128ha) as part of the Upperchurch Hen Harrier Scheme, over;
- A long-term to permanent duration, and with;
- The sensitive management of 128Ha of lands for Hen Harrier as part of the Upperchurch Hen Harrier Scheme will also increase the suitable habitat present for Meadow Pipit.
- Low reversibility

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to General Bird Species with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

Biodiversity

Topic

8.7.4.2 Impact Evaluation Table: Golden Plover - Habitat Loss

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction Works; Excavation; Movement of Soils and Machinery
Cumulative Impact Source: Construction Works; Excavation; Movement of Soils and Machinery, afforestation
Impact Pathway: Land Take

Impact Description: As an Annex I species Golden Plover is a High Sensitivity receptor. Land cover change of suitable foraging or roosting habitat such as improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog, where construction works areas overlap may cause reductions in foraging success, increased exposure to predation through displacement to less viable feeding areas, and also reduction in survival rates of wintering birds.
No breeding Golden Plover will be affected as all works for the Elements of the Whole UWF Project are outside the Irish breeding range. In addition numbers of birds recorded, and therefore potentially affected, are low within the context of the Irish wintering population.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Golden Plover: Habitat Loss

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude: Permanent land-use change of suitable wintering habitat at the Mountphilips Substation site will comprise 1.75Ha in total, of which 1.7ha is improved agricultural grassland (GA1), with the remaining 0.05ha comprising wet grassland (GS4). Temporary land-use change (in the area of the new End Masts) during construction will comprise 0.2ha of improved agricultural grassland (GA1). However, the habitats present at this location are not suitable for Golden Plover due to the enclosed nature of the improved grassland fields, and therefore no effective habitat loss is expected to occur at the Mountphilips Substation site.

No habitat loss will occur along the 110kV UGC route where is occurs outside of the Mountphilips Substation site (i.e. on the public road and private paved road section of the 110kV UGC).
The magnitude of habitat loss effects to Golden Plover is therefore evaluated as Negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- as per Section 8.7.1.2, the high sensitivity rating of the species, based on conservation status, and the Negligible magnitude of the impact;
- No suitable habitat loss, notwithstanding;
- The permanent duration, and;
- Low reversibility

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: No cumulative effect will occur to habitats in combination with the UWF Grid Connection due to the permanent land cover change associated with the UWF Grid Connection will be confined to the Mountphilips Substation area c.22km linear separation distance from any of the Other Elements

Significance of the Impact: No cumulative effect

Rationale for Impact Evaluation:

- The separation distance between land cover change locations for UWF Grid Connection (Mountphilips Substation site) and the Other Elements.

General Bird Species

Sensitive Aspect

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

Element 2: UWF Related Works

Impact Magnitude:
Permanent land cover change will comprise 0.2Ha of suitable foraging or roosting habitat for wintering Golden Plover as improved agricultural grassland (0.12ha) and wet grassland (0.07ha). The scale of habitat loss represents 0.16% of available suitable Golden Plover habitat (120Ha – comprising improved agricultural grassland, grassland mosaics, upland blanket bog and cutaway bog) within the study area boundary. Golden Plover were not recorded from the locations of the UWF Related Works, during any site visits and none were observed during studies to inform Upperchurch Windfarm 2013 EIS.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The extent of habitat loss (0.2Ha), is negligible(i.e. <1% of available habitat) and represents a very slight change from baseline conditions;
- The availability of suitable foraging and roosting habitat (at minimum 119.8Ha) in the greater area, notwith-standing;
- The long term duration, and;
- Low reversibility with permanent land cover change likely.

Element 3: UWF Replacement Forestry

Impact Magnitude:
Permanent land cover change of 3.98Ha of suitable foraging or roosting grassland habitat to deciduous woodland will occur. This represents 37% of the available habitats within the UWF Replacement Forestry study area (10.7Ha). Golden Plover were not recorded during any site visits and none were observed in the area during studies to inform Upperchurch Windfarm 2013 EIS.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The extent of suitable habitat to be affected (3.98Ha or 37% of that available within the study area);
- The permanent duration, and;
- Low reversibility with land cover change likely

Element 4: Upperchurch Windfarm

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

Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:

- No Golden Plover were recorded during winter bird studies of the Upperchurch Windfarm

Element 5: UWF Other Activities

Impact Magnitude: Negligible

Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:

- No suitable habitat is present for roosting or foraging Golden Plover, and
- Golden Plover are not known to utilize roadside verges/roundabouts for foraging or roosting, and;
- Golden Plover were not recorded within the locations for the Upperchurch Hen Harrier Scheme;
- Monitoring does not include land take or land cover changes

Biodiversity

Topic

Evaluation of Other Cumulative Impacts – Golden Plover: Habitat Loss
Whole UWF Project Effect
Magnitude: Instances of land cover change in respect of suitable foraging or roosting habitat will occur from works on either side of the Slievefelim to Silvermines Mountain upland area, with habitat loss associated with UWF Grid Connection (1.75ha), UWF Related Works (0.2Ha), Upperchurch Windfarm (7.81Ha) and UWF Replacement Forestry (3.98Ha). Overall suitable habitat loss is 13.74ha, which is considered to be Negligible in the context of the area of available habitat.
Significance of the Whole Project Effect: Imperceptible
Rationale for Impact Evaluation: • The high sensitivity rating of the species and Negligible magnitude of habitat loss, counterbalanced with; • No birds recorded • The extent of habitat loss overall in the context of the availability of habitat within the study area, and not withstanding; • The permanent duration, and; • Low reversibility

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to General Bird Species with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

General Bird Species

Sensitive Aspect

8.7.4.3 Impact Evaluation Table: Golden Plover - Disturbance/Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: During Construction Noise and Visual and Intrusion
Cumulative Impact Source: During Construction Noise and Visual and Intrusion
Impact Pathway: Air

Impact Description: As an Annex I species Golden Plover is a High Sensitivity receptor. Disturbance to/displacement of wintering Golden Plover due to noise, visual intrusion or anthropogenic sources may occur during the period October to March when the highest proportion of birds (wintering) could be potentially present within the receiving environment.

As works will only be conducted during daylight hours as part of Project Design, disturbance to birds foraging at night (when most foraging takes place) is avoided. Displacement during daylight hours, if of sufficient duration and from high value foraging areas may result in effective habitat loss with consequent effects on feeding success, winter survival and breeding capacity; dependant on numbers of birds affected and availability of alternative habitat. No breeding Golden Plover will be directly affected as all works are outside the Irish breeding range.

Sources of disturbance are likely; however the degree of avoidance/response may also vary from individual to individual and as flock size varies may be limited in spatial extent. The duration of disturbance events are assumed to be brief given the linear nature of most of the works – however as birds may range over wide areas there is the potential for sequential effects i.e. from multiple concurrent sources. In this instance birds displaced from one location may experience a second disturbance stimulus from e.g. another work crew.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Golden Plover: Disturbance/Displacement

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
No Golden Plover were recorded during any of the ecological surveys on the proposed 110kV UGC route in 2019. While some suitable habitat exists in close proximity to the public road along the 110kV UGC route, traffic is already causing disturbance on roads and use of suitable adjacent lands is unlikely. Furthermore the duration of works along the public road are assumed to be brief given the linear nature of the works.

Due to the enclosed nature of the improved grassland fields at the Mountphilips Substation site, it is considered that Golden Plover are not likely to occur in close proximity to construction works at the Mountphilips Substation site, and therefore disturbance will not occur here.

The Magnitude of disturbance effects is therefore considered negligible, if it occurs at all.

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Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- No Golden Plover were recorded at the Mountphilips Substation during any ecological surveys between 2016 and 2019.
- Activities such as cable trenching will not contrast significantly from baseline activities such as road works or farming related works, and;
- The duration of any individual disturbance events will be brief, and;
- Reversible once works finish, with birds expected to return, and;

- Any response is not expected to be permanent, based on studies of the species with regard to large construction sites (wind farm sites, as per Pearce-Higgins et al., 2012) and therefore unlikely to alter long term wintering trends;

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: UWF Grid Connection works have the potential to cause additive disturbance effects at the eastern extent of the project where UWF Grid Connection works occur within 1km of the UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm, all three having suitable Golden Plover habitat. The potential for cumulative impacts relates to the increased disturbance as a result of multiple crews of people and machinery carrying out various works and activities. However, the cumulative magnitude of impact is considered to be negligible due to the absence of Golden Plover recorded on any of the UWF Related Works, UWF Replacement Forestry and Consented Upperchurch Windfarm sites, and the extent of available habitat in the wider surrounding area and the carrying out of works during daylight hours. Furthermore the transient nature and duration of works for the UWF Grid Connection along the public road and private paved road further reduce the potential for cumulative effects.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- No Golden Plover were recorded during ecological field surveys for the proposed UWF Grid Connection
- No Golden Plover were recorded in baseline studies for the Upperchurch Windfarm, which overlaps the works locations for UWF Related Works, or observed during site surveys for UWF Related Works or UWF Replacement Forestry therefore;
- Due to the absence of birds recorded in the area, there is a Very Low probability of disturbance notwithstanding suitable habitat is present.

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

Element 2: UWF Related Works

Impact Magnitude:
120ha of suitable habitat for wintering Golden Plover occurs within the study area for UWF Related Works. However no birds have been recorded utilising these locations in studies described herein. The magnitude of any disturbance is therefore negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- No birds were recorded in baseline studies for the Upperchurch Windfarm, which overlaps the works locations for UWF Related Works, or observed during site surveys for UWF Related Works therefore;
- The probability of disturbance is significantly reduced (to an evaluation as low), notwithstanding suitable habitat is present.
- Activities such as cable trenching will not contrast significantly from baseline activities such as road works or farming related works, and;
- The duration of any individual disturbance events (if any) will be brief, and;
- Reversible once works finish, with birds expected to return, and;
- Any response is not expected to be permanent, based on studies of the species with regard to the construction of wind farms (Pearce-Higgins et al 2012) and therefore unlikely to alter long term wintering trends.

Element 3: UWF Replacement Forestry

Impact Magnitude: Although suitable habitat occurs (Improved Agricultural Grassland and Wet Grassland), no Golden Plover were recorded at the site. The magnitude of planting works will be negligible.

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation: • All planting will be done by hand and will not contrast to baseline agricultural activities.
Element 4: Upperchurch Windfarm
Impact Magnitude: Although suitable habitat occurs, including 5.98ha of Improved Agricultural Grassland, no Golden Plover were recorded at the site during either surveys for the 2013 EIS/RFI or during surveys for UWF Related Works
Significance of the Impact: Neutral Impact
Rationale for Impact Evaluation: • No Golden Plover were recorded in studies to inform the EIS for the Upperchurch Windfarm
Element 5: UWF Other Activities
Impact Magnitude: None
Impact Evaluation**:** Neutral impact
Rationale for Impact Evaluation: • The Haul Route Activity locations do not include suitable habitat to attract Golden Plover, and; • Activities will not contrast from baseline activities already present, such as farming related works and road maintenance. • Overhead Line Activities will be similar to existing maintenance which is undertaken; will occur during daylight hours and will not result in any contrast from the existing environment.
Evaluation of Other Cumulative Impacts – Golden Plover: Disturbance/Displacement
Whole UWF Project Effect
Magnitude: Instances of disturbance has potential to occur on suitable foraging/roosting winter habitat from construction works and the presence of work crews on either side of and traversing the Slievefelim to Silvermines Mountain upland area. The magnitude of cumulative whole project will be negligible, as no Golden Plover were recorded within study areas for any Element.
Significance of the Whole Project Effect: Not Significant
Rationale for Impact Evaluation: • No birds recorded, and; • Activities such as cable trenching, road works, will cause very slight changes from baseline activities such as farming related works, even if multiple instances occur simultaneously, and; • The duration of individual disturbance events (including sequential) will be brief, limited to daylight hours and; • Reversible once works finish, with birds expected to return, and; • Any response is not expected to be permanent, based on studies of the species with regard to the construction of wind farms (Pearce-Higgins et al., 2012) and therefore unlikely to alter long term wintering trends.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to General Bird Species with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

8.7.4.4 Impact Evaluation Table: Kingfisher, Grey Wagtail and Dipper - Disturbance/Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: During Construction Noise and Visual and Intrusion
Cumulative Impact Source: During Construction Noise and Visual and Intrusion
Impact Pathway: Air, Visibility

Impact Description: Kingfishers and Grey Wagtail have both been assigned a Sensitivity rating of Low, while Dipper is assigned a Sensitivity rating of Negligible.

There is suitable habitat for Kingfisher along the larger watercourses in the vicinity of the proposed 110kV UGC, as evidenced by the record of a Kingfisher nest 540m upstream of crossing point W7. Once territories have been established, Kingfishers are not considered to move substantial distances, although they may be forced to move to coastal areas due to severe (cold) weather (Morgan & Glue, 1977). There is a suggestion that disturbance close to nesting sites may impact Kingfishers (such as from fishermen), but the impact within foraging areas (e.g. water spots) is low (Machar, 2008). Although exact data on this is sparse, Livesey *et al*. (2016) indicates a Minimum Approach Distance for Coraciiformes (the order to which Kingfisher belong) of 25.2m.

There are suitable habitats for breeding Grey Wagtail at water crossing locations. Although nesting within cavities within built structures next to watercourses appear to be a favoured location (Smiddy & O'Halloran, 1998) this species will nest at habitats that may be away from watercourses and/or crossing points (Tyler, 1972). Grey Wagtails disperse in winter months to lower-lying and coastal areas (Smiddy & O'Halloran, 1998). Although fidelity to nesting sites between years is not confirmed, a pair may have multiple broods within close proximity during a single nesting season.

Dippers always build their nests with the opening over running water, therefore bridges are a particularly favoured habitat, although other man-made structures next to watercourses (including buildings or walls) as well as natural nest sites (such as rock-faces, tree roots or banks that overhang watercourses) are also used (Shaw, 1978). Adult Dippers show a very high degree of site fidelity to their breeding location from season to season (O'Halloran *et al*., 2000). Juveniles will disperse away from the natal site, although they typically remain within the same river system (if not the same watercourse) when establishing territories (O'Halloran *et al*., 2000; Tyler & Ormerod, 1994).

Project design measures include pre-construction surveys for breeding birds at the proposed river crossing structures where works are to be carried out. These will be undertaken by a competent ecologist to ensure that any works that proceed are in full compliance with the requirements of the Wildlife Acts. In addition, supplementary nesting sites for Grey Wagtail and Dipper will be provisioned on relevant structures (or their immediate vicinity) where identified as appropriate.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Kingfisher, Grey Wagtail and Dipper: Disturbance/Displacement

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Kingfisher: A Kingfisher nest was found c.540m upstream in a sandy bank on the Newport River. However, suitable Kingfisher habitat was only present from c.400m upstream and further upstream past the nest location. The watercourse downstream from this (i.e. from 400m upstream of the crossing point W7 to 500m downstream) was typically shallow and fast-flowing with many in-stream boulders and riffles or small waterfalls. These riverine habitats are not utilised by Kingfisher for foraging, which prefer slow-flowing waterways for

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feeding; Snow & Perrins, 1998). It is therefore likely that Kingfisher foraging from the nest is from c.400m upstream from the crossing point (W7) and further upstream from this. Given the distance separating the suitable breeding habitat and the proposed works, coupled with low sensitivity to disturbance, no likely effects are reasonably foreseeable.

Grey Wagtail: a probable Grey Wagtail nest was recorded at watercourse crossing W36 and a total of 11 Grey Wagtail were recorded during the April 2019 transect along the proposed 110kV UGC . Given this species use of a variety of riparian and non-riparian habitats for nesting, any effects of the proposed works on Grey Wagtail are therefore considered to be negligible.

Dipper: Dipper nests were recorded at three water crossing locations; one nest at water crossing W18, two nests at watercourse crossing W28 and one nest at watercourse crossing W41. One other water crossing (W23) was identified as suitable for Dipper; however, no evidence of Dipper was recorded at this location. There is therefore the potential for three pairs of Dippers to be affected at the indicated crossing points. However, the stated Project Design measures will ensure that suitable nesting sites are retained and increased through the provision of targeted nesting box provisioning. The magnitude of disturbance effects is therefore considered to be negligible.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Low and Negligible Sensitivity and Magnitude of disturbance effects;
- implementation of Project Design Measures for Grey Wagtail and Dipper and Kingfisher;
- Activities such as cable trenching will not contrast significantly from baseline activities such as road works or farming related works, and;
- The duration of any individual disturbance events will be brief, and;
- Reversible once works finish.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Low and Negligible Sensitivity and Negligible Magnitude of disturbance effects;
- Separation distance between nests identified along the 110kV UGC route and the Other Elements.
- Due to the separation distance from proposed works to suitable habitat, there is a Very Low probability of disturbance notwithstanding suitable habitat is present.

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

Element 2: UWF Related Works

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Impact Magnitude:
No Kingfisher nests were identified within the zone of effect at watercourse crossing locations associated with UWF Related Works, therefore impacts are not expected to occur. No Dipper or Grey Wagtail were recorded during fieldwork within 50m buffer for the Related Works, although targeted surveys for these species was not undertaken in this area. The Magnitude of disturbance effects is therefore considered to be Negligible.

Significance of the Impact: Neutral

Rationale for Impact Evaluation:

- Low and Negligible Sensitivity and Negligible Magnitude of disturbance effects;
- Activities such as cable trenching and haul route works will not contrast significantly from baseline activities such as road works, and;

- The duration of any individual disturbance events will be brief, and;
- Reversible once works finish.
- No birds were recorded or observed during site surveys for UWF Related Works therefore;
- The probability of disturbance is Very Low, notwithstanding suitable habitat is present for Dipper, Kingfisher and Grey Wagtail.

Element 3: UWF Replacement Forestry

Impact Magnitude: None – No watercourse crossing works associated with this element, with works carried out by hand and the implementation of a buffer zone along the stream onsite, therefore no potential to cause disturbance effects to Kingfisher, Grey Wagtail or Dipper.

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- All planting will be done by hand and will not contrast to baseline agricultural activities.
- no works in close proximity to the watercourse

Element 4: Upperchurch Windfarm

Impact Magnitude: Only one watercourse with potentially suitable habitat within the windfarm site, no instream works associated with this watercourse – with works limited to the construction of a clear span bridge at this watercourse. No Kingfisher, Grey Wagtail or Dipper observed or recorded during baseline studies.

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- Low and Negligible Sensitivity and Negligible Magnitude of disturbance effects;
- The duration of any individual disturbance events will be temporary, and;
- Reversible once works finish.
- No birds were recorded or observed during site surveys for Upperchurch Windfarm or UWF Related Works therefore;
- The probability of disturbance is Very Low, notwithstanding suitable habitat is present for Dipper, Kingfisher and Grey Wagtail.

Element 5: UWF Other Activities

Impact Magnitude: No watercourse crossing works required for this element, with any activities in close proximity small in scale, and mostly carried out by hand with minimal use of machinery. Therefore the magnitude of any disturbance is evaluated as Negligible.

Impact Evaluation**:** Neutral impact

Rationale for Impact Evaluation:

- Low and Negligible Sensitivity and Negligible Magnitude of disturbance effects;
- No watercourse works required;
- Activities will not contrast from baseline activities already present, such as farming related works and road maintenance.
- Overhead Line Activities will be similar to existing maintenance which is undertaken; will occur during daylight hours and will not result in any contrast from the existing environment.

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Evaluation of Other Cumulative Impacts – Kingfisher, Grey Wagtail and Dipper: Disturbance/Displacement
Whole UWF Project Effect
Magnitude: Instances of disturbance has potential to occur from construction works and the presence of work crews at watercourse crossing points on either side of and traversing the Slievefelim to Silvermines Mountain upland area. Both birds and nests were recorded within the UWF Grid Connection study area only, and it is considered unlikely that material populations of these birds are present at the UWF Related Works/Upperchurch Windfarm area. The magnitude of cumulative whole project is therefore considered to be negligible.
Significance of the Whole Project Effect: Imperceptible
Rationale for Impact Evaluation: • Low and Negligible Sensitivity and Negligible Magnitude of disturbance effects; • Works such as cable trenching, road works in the context of baseline activities such as public road use and farming related works, and; • Temporary duration, which will be; • Reversible once works finish.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to General Bird Species with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

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8.7.4.5 Impact Evaluation Table: General Birds - Habitat Enhancement

Impact Description	
Project Life Cycle Stage:	Operational Stage

Impact Source: Reinstatement of vegetation and Replanting of trees/hedgerow at construction works areas
Cumulative Impact Source: Reinstatement, Replanting, enhancement planting, maintenance of rush swards, Planting of Deciduous Trees
Impact Pathway: Land cover Change

Impact Description: With respect to linear features such as treelines and hedgerow, it will be necessary to remove 160m of treeline which includes 17 immature trees and 1 mature tree at the Mountphilips Substation site entrance to widen the entrance and provide sightlines. These will be reinstated by planting the equivalent amount of hedgerow and/or trees behind the new sightlines. It will be necessary to remove 40m of hedgerow which includes 11 immature trees to build the new permanent access road. New hedgerow, c.700m in length, will be planted on the berms on either side of the new permanent access road between the Site Entrance and Mountphilips Substation and around Mountphilips Substation; the sides of the berms will be seeded with native grass and wildflower species, for the benefit of biodiversity in the area. All new hedging will be locally sourced native fruiting hedgerow species, and the replacement trees will be native hedgerow species and at least 10 years old.

The planting of equivalent deciduous forestry for lower ecological value conifer plantation, as UWF Replacement Forestry, in addition the use of locally sourced native hedgerow and tree species in all landscaping and reinstatement will constitute a land cover change to higher value habitat for general birds.

In addition the management measures as part of the Upperchurch Hen Harrier Scheme such as the maintenance of rush swards, enhancement and planting of hedgerows and riparian habitat, and promotion of semi-natural habitat will increase habitat quality for ground nesting birds such as Meadow Pipit and Skylark, and general birds of open countryside – this will have secondary positive effects not only on Hen Harrier but additionally other raptor species which may be present such as Kestrel.

It is likely that the above will result in a net gain to overall bird diversity - with the duration being permanent in the case of the UWF Grid Connection and UWF Replacement Forestry, and at least long term in the case of the UWF Related Works, Upperchurch Hen Harrier Scheme and Upperchurch Windfarm.

Impact Quality: Positive

Evaluation of the Subject Development Impact – General Birds: Habitat Enhancement

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
At Mountphilips Substation site, the hedgerow/trees at the site entrance will be removed, and a new hedgerow with semi-mature trees will be planted behind the new sightlines.
Habitat enhancement will comprise of 700m of new native species hedgerow will be planted alongside the new permanent access road between Mountphilips Substation Site Entrance and the new Mountphilips Substation, and the establishment of native grass and wildflower species along the sides of the berms along the new permanent access road and on the berms around Mountphilips Substation.

Significance of the Impact: Slight (positive)

Rationale for Impact Evaluation:

- The benefit to bird diversity, and;
- The positive minor contrast with emerging trends in respect of land management and existing land cover, and;
- The permanent duration, and;

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- The low reversibility with these enhancement features being part of the design of the operational UWF Grid Connection.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude:
No cumulative effect will occur due to habitat enhancement in combination with the Other Elements due to the separation distance (c.22km) between the habitat enhancement at Mountphilips and the habitat enhancement associated with UWF Replacement Forestry, UWF Related Works, Upperchurch Windfarm and the Upperchurch Hen Harrier Scheme (UWF Other Activities). At this distance there will be no overlap in breeding territories, or local populations.

Significance of the Cumulative Impact: **No Cumulative Impact**

Rationale for Cumulative Impact Evaluation:

- The benefit to bird diversity, and;
- The contrast with emerging trends in respect of land management and land cover, and;
- The duration which is long term to permanent, and;
- The low reversibility.

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

Element 2: UWF Related Works

Impact Magnitude:
Equivalent lengths of native hedgerow and native trees will be replanted in lieu of hedgerow removal. In addition, c.370m of new hedgerow will be planted alongside the Realigned Windfarm Road RWR2.

Significance of the Impact: Imperceptible (positive)

Rationale for Impact Evaluation:

- The benefit to bird diversity, and;
- The contrast with emerging trends in respect of land management and land cover, and;
- The duration which is long term to permanent, and;
- The low reversibility.

Element 3: UWF Replacement Forestry

Impact Magnitude:
In total, 4Ha of mixed species, native woodland will be created, at the UWF Replacement Forestry lands (6ha in area) which will comprise tall trees and understorey shrubs, along with wide ride lines, and a mix of tall grasses and scrub land cover maintained during the growth stage. The existing riparian habitat will be enhanced through the planting of Hazel, Alder and Willow species, and protected through the placement of fencing.

Significance of the Impact: Slight (positive)

Rationale for Impact Evaluation:

- The benefit to bird diversity, and;
- The contrast with emerging trends in respect of land management, and;
- The permanent duration, and;
- The low reversibility with proposed enhancement already incorporated into project design.

Element 4: Upperchurch Windfarm

Impact Magnitude:
The planting of 360m of new hedgerow using native species, and the enhancement of existing hedgerows with native species will constitute a land cover change to a higher value habitat for general birds.

Significance of the Impact: Imperceptible (positive)
Rationale for Impact Evaluation: • The benefit to bird diversity, and; • The low reversibility with proposed enhancement already incorporated into project design.
Element 5: UWF Other Activities
Impact Magnitude: The Upperchurch Hen Harrier scheme will result in 2.2Ha of trees, 1.4km of riparian habitat and 2.8km of new hedgerow being enhanced or created during initial activities. In total 128Ha of agricultural lands will be managed. The measures to be incorporated such as planting of scrub along riparian corridors, management of rush coverage, reductions in stocking levels, limiting of drainage, fertilizing, burning or hedgerow removal will constitute a land cover change to a higher value habitat for general birds.
Significance of the Impact: Significant (positive)
Rationale for Impact Evaluation: • The benefit to bird diversity, and; • The contrast with emerging trends in respect of land management, and; • The duration proposed for management, and; • The low reversibility with proposed enhancement already consented
Evaluation of Other Cumulative Impacts – General Birds: Habitat Enhancement
Whole UWF Project Effect
Magnitude: Instances of enhancement, and management of habitat specifically for the benefit of birds will occur as part of the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry (by design), and Upperchurch Windfarm. Cumulative positive effects may accrue due to the proximity of the UWF Replacement Forestry to the Upperchurch Hen Harrier Scheme.
Significance of the Whole Project Effect: Slight (positive)
Rationale for Impact Evaluation: • The benefit to bird diversity, and; • The minor positive contrast with emerging trends in respect of land management and land cover, and; • The duration which is long term to permanent, and; • The low reversibility.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to General Bird Species with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

8.7.4.6 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-59 below.

Table 8-59: Description and Rationale for Excluded Impacts to General Bird Species

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

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage / Planting Stage				
Noise and human activity	1,2,3,4,5	Air and Visibility	Disturbance/ displacement of Meadow Pipit	Meadow Pipit: Evaluated as Excluded - Meadow Pipit are not considered to be particularly susceptible to impacts from wind farms (SNH, 2014) – including construction stage disturbance. Studies on the impacts of wind farms during both construction (Pearce-Higgins *et al.* 2012[34]) and operation (Pearce-Higgins *et al.* 2009[35]) have found little evidence of significant disturbance effects on this species. Therefore, it is considered that neither UWF Grid Connection nor the Whole UWF Project are likely to cause significant impacts to this species.
Land take	1,2,3,4,5	Land cover	Habitat Loss (Merlin, Peregrine Red Grouse, Eurasian Curlew)	Merlin: Evaluated as Excluded - No Habitat Loss from Elements (1, 2, 3, 4, 5) including Overhead Line Activities as part of 'UWF Other Activities'
	1,2,3,4,5			Red Grouse: Evaluated as Excluded - No Habitat Loss from Elements (1, 2, 3, 4, 5) including Overhead Line Activities as part of 'UWF Other Activities'
	1,2,3,4,5			Peregrine: Evaluated as Excluded - No Habitat Loss from Elements (1, 2, 3, 4, 5)
	1,2,3,4,5			Eurasian Curlew: Evaluated as Excluded - No evidence of Curlew within the study areas for Elements 1, 2, 3, 4, 5 was noted. Furthermore, it is considered that no currently suitable breeding habitat will be subject to land cover change as a result of the Whole UWF Project. Furthermore, there will be no loss of suitable habitat in relation to element 1. No habitat loss from Other Elements including Overhead Line Activities as part of 'UWF Other Activities'.
	1		Habitat Loss (Kingfisher, Grey Wagtail, Dipper)	Evaluated as Excluded – Kingfisher, Grey Wagtail and Dipper were only recorded within the UWF Grid Connection Study Area. Instream works are limited to the Mountphilips Substation site where no suitable habitat occurs. Along the 110kV UGC route, culvert replacement works will not affect the bank or bed of the watercourse either upstream or downstream of the crossing point, with works limited to the replacement of the existing structure, with all works carried out from

[34] Greater Impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Pearce-Higgins, J.W., Stephen, L., Douse, A., Langston, R.H.W. s.l. : Journal of Applied Ecology, 2012, Vol. 49, pp. 386-394

[35] The distribution of breeding birds around upland wind farms. Pearce-Higgins, J.W., Leigh,S., Langston, R.H.W., Bainbridge, Ian.P., Bullman, R. s.l. : Journal of Applied Ecology, 2009, Vol. 46, pp. 1323-1331.)

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				the road pavement above, therefore any impacts will be Neutral. In relation to UWF Related Works, Kingfisher, Grey Wagtail or Dipper were not identified in any surveys. Watercourse crossing works will occur at 32 locations. However any effects will be Neutral given the absence of records of these species, the temporary duration of works, and the reinstatement of the watercourse in accordance with project design and best practice measures. No instream works associated with Upperchurch Windfarm or UWF Replacement Forestry or UWF Other Activities, therefore no potential for habitat loss from these Elements.
	1,2,3,4,5	Visibility	Disturbance/ Displacement (General Birds, Red Grouse, Merlin, Eurasian Curlew, Peregrine, Barn Owl	General Birds: Most passerine (perching) species and general lowland farmland birds are not considered to be particularly susceptible to impacts from wind farms (SNH, 2014) – including construction stage disturbance. Studies on the impacts of wind farms during both construction (Pearce-Higgins *et al.* 2012) and operation (Pearce-Higgins *et al.* 2009) have found little evidence of significant disturbance effects on passerine species.
	1,2,3,4,5			Red Grouse: Evaluated as Excluded - No habitat loss from Whole UWF Project Elements 1, 2, 3, 4, 5 including Overhead Line Activities as part of 'UWF Other Activities'.
	1,2,3,4,5			Merlin: Evaluated as Excluded - Low numbers of wintering birds will not be measurably affected by the scale of visual intrusion or disturbance. This includes Overhead Line Activities as part of 'UWF Other Activities'.
	1,2,3,4,5			Eurasian Curlew: No Eurasian Curlew recorded within the study areas for Elements 1, 2,3,4,5.
	1,2,3,4,5			Peregrine: Evaluated as Excluded - Low numbers of wintering birds will not be measurably affected by the scale of visual intrusion or disturbance. This includes Overhead Line Activities as part of 'UWF Other Activities'.
	1			Barn Owl are excluded as no birds were recorded within 50m of works, and works will take place during daylight hours only. Also evaluated as Excluded from cumulative effects as these species were not identified during UWF Related Works/Upperchurch Windfarm surveys, only recorded in relation to element 1.
Move-ment of machin-ery and soils,	1,2,4,5	Direct Contact	Physical injury/destruction of nests or chicks – General Birds, Dipper, Grey Wagtail, Barn Owl	Evaluated as Excluded – General Birds; In relation to UWF Grid Connection, including vegetation clearance and tree felling at Mountphilips Substation site will occur outside the bird nesting season; Effects on ground nesting birds including Meadow Pipit from works such as cable trenching (UWF Related Works only) will be overseen by Project Ecologist and therefore effects will be Neutral.
Hedge-row trimming	1, 2, 4			

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
, tree felling				Dipper, Grey Wagtail and Barn Owl; Evaluated as Excluded- In relation to UWF Grid Connection , Neutral effects due to limited extent of works, separation distance to potential breeding sites, supervision of project ecologist and project design measures. In relation to UWF Related Works, no likely effects as these species were not identified during UWF Related Works surveys, (only recorded in relation to element 1). No instream works associated with Elements 3, 4, 5. Therefore no potential to cause physical injury or destruction of nests or chicks. No works in buildings (where Barn Owl could nest) associated with any of the Elements.
Forestry felling	2, 4			
Operational Stage / Growth Stage				
Maintenance Noise/ Visual intrusion	1,2,3,4,5	Air and Visibility	Disturbance/ displacement – (Meadow Pipit, Golden Plover, Eurasian Curlew, Red Grouse, Merlin, Peregrine, Kingfisher, Dipper Grey Wagtail, Barn Owl	Meadow Pipit: Evaluated as Excluded; Neutral disturbance/displacement effects are expected due to maintenance activities because all maintenance works will be carried out from hardcore surfaces (Elements 1, 2, 3, 4), from public road (Elements 1,5), or on foot (Elements 2,3,5).
				Golden Plover: Evaluated as Excluded - Neutral disturbance/displacement effects are expected due to maintenance activities because all maintenance works will be carried out from hardcore surfaces (Elements 1, 2, 3, 4), from public road (Elements 1,5), or on foot (Elements 2,3,5).
				Eurasian Curlew: Evaluated as Excluded; Neutral effects predicted due to lack of birds in area.
				Red Grouse: Evaluated as Excluded; Neutral effects predicted due to lack of birds in area.
				Merlin: Evaluated as Excluded; Neutral effects predicted due to lack of birds in area.
				Peregrine: Evaluated as Excluded; Neutral effects predicted due to lack of birds in area.
				Kingfisher, Dipper, Grey Wagtail and Barn Owl; Evaluated as Excluded as operational maintenance is unlikely to result in any works contrasting to baseline conditions.
Decommissioning Stage				
Noise and human activity	2,4,5	Air, Visibility	Disturbance/Displacement Mortality of ground nesting birds – Meadow Pipit	Meadow Pipit: Evaluated as Excluded as there are no decommissioning activities associated with either the UWF Grid Connection or UWF Replacement Forestry, and very minor decommissioning activities associated with the UWF Related Works, Upperchurch Windfarm or UWF Other Activities. In relation to Upperchurch Windfarm (Element 4), Activities will only take place at existing hard stand locations within Upperchurch Windfarm, will be temporary in duration, reversible, and occur primarily in habitats of low value for Meadow Pipit. Studies on the

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				impacts of wind farms during both construction (Pearce-Higgins *et al.* 2012) and operation (Pearce-Higgins *et al*. 2009) have found little evidence of significant disturbance effects on passerine species. This is also applicable to decommissioning.
			Disturbance/ Displacement (Golden Plover, Eurasian Curlew, Red Grouse, Merlin)	Golden Plover: Evaluated as Excluded - as there are no decommissioning activities associated with either the UWF Grid Connection or UWF Replacement Forestry, and very minor decommissioning activities associated with the UWF Related Works or UWF Other Activities. No Golden Plover were recorded in studies for Upperchurch Windfarm (Element 4), and decommissioning activities will be relatively small in scale and occur from hardstand areas.
				Eurasian Curlew: Evaluated as Excluded; Neutral effects predicted due to lack of birds in area.
				Red Grouse: Evaluated as Excluded; Neutral effects predicted due to lack of birds in area.
				Merlin: Evaluated as Excluded - as there are no decommissioning activities associated with either the UWF Grid Connection or UWF Replacement Forestry, and no significant decommissioning activities associated with the UWF Related Works or UWF Other Activities. Decommissioning (4) is not likely to affect Merlin due to low numbers of wintering Merlin in the area.

8.7.5 Mitigation Measures for Impacts to General Bird Species

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

8.7.6 Evaluation of Residual Impacts to General Bird Species

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for General Bird Species above (Section 8.7.4) – i.e. **no significant adverse impacts**.

8.7.7 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 a Invasive Species Specialist.

8.7.8 Summary of Impacts to General Bird Species

A summary of the Impact to General Bird Species is presented in Table 8-60.

Table 8-60: Summary of the impacts to General Bird Species

Impact to General Bird Species:	**Meadow Pipit: Habitat Loss**	**Golden Plover: Habitat Loss**	**Golden Plover: Disturbance /Displacement**	**Kingfisher, Grey Wagtail & Dipper: Disturbance /Displacement**	**General Birds: Habitat Enhancement**
Evaluation Impact Table	*Section 8.7.4.1*	*Section 8.7.4.2*	*Section 8.7.4.3*	*Section 8.7.4.4*	*Section 8.7.4.5*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction
UWF Grid Connection *Direct/indirect impact*	**Not Significant**	**Imperceptible**	**Not Significant**	**Imperceptible**	**Slight (positive)**
UWF Grid Connection *Cumulative impacts*	**No Cumulative Impact**	**No Cumulative Impact**	**Not Significant**	**Imperceptible**	**No Cumulative Impact**
Element 2: UWF Related Works	Not Significant	Imperceptible	Not Significant	Neutral	**Imperceptible (positive)**
Element 3: UWF Replacement Forestry	Slight	Slight	Neutral	Neutral	**Slight (positive)**
Element 4: Upperchurch Windfarm	Slight	Neutral	Neutral	Neutral	**Imperceptible (positive)**
Element 5: UWF Other Activities	**Moderate (positive)**	Neutral	Neutral	Neutral	**Significant positive**
Cumulative Impact:					
All Elements of the Whole UWF Project	Slight	Imperceptible	Not Significant	Imperceptible	**Slight (positive)**

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

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 General Bird Species with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

8.8 Sensitive Aspect No.7: Bats

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

Nick Marchant, Jennifer Pearson, Chris Cullen and Howard Williams were the main authors of this Section. Please see Sources of Informaiton (Section 8.1.7) and Methodology (Section 8.1.8) for details of the desktop and fieldwork surveys which have informed the evaluation of Bats.

8.8.1 BASELINE CHARACTERISTICS of Bats

8.8.1.1 STUDY AREA for Bats

The study area for Bats in relation to the UWF Grid Connection is described in Table 8-61 and illustrated on UWF Grid Connection Study Area for Bats (Overview and Maps 1 to 2) (Volume C3 EIAR Figures).

Table 8-61: UWF Grid Connection Study Area for Bats

Study Area for Bats	Justification for the Study Area Extents
• Buildings within 150m of the construction works area boundary • Mature trees within 50m of the construction works area boundary; • Linear vegetation features (e.g. hedgerows) of high suitability for foraging bats within the construction works area boundary; • Bridges within the construction works area boundary and along material haulage routes on the local road network between the concrete/stone suppliers and the works locations.	Professional Judgement and as per Best Practice: Bat Surveys for Professional Ecologists: Good Practice Guidelines, Collins, (2016), The Conservation of Bats in Bridges Project – A Report on the survey and conservation of bat roosts in bridges in Cumbria, Billington and Norman (1997), Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland,

8.8.1.2 Baseline Context and Character of Bats in the UWF Grid Connection Study Area

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

Desktop Survey of Landscape Suitability

Bats are common and widespread throughout Ireland, and occupy a wide variety of habitats. In a regional context, the following is noted in the (Draft) North Tipperary Biodiversity Plan 2007: "*Many bat species forage in woodland and over water, and the combination of both habitats within North Tipperary makes the area valuable for bat species. Built structures, such as bridges, that occur close to water are of particular value as roosts. Six of Irelands bat species are known to occur in North Tipperary: common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle Pipistrellus pygmaeus, Leisler's bat Nyctalus leisleri, Natterer's bat Myotis nattereri (records from www.batconservationireland.org), Brown long-eared bat Plecotus auritus and Daubenton's bat Myotis daubentonii (pers comm. S. Jones, S. Geraghty[36])*". In addition, the author has

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

recorded Nathusius' pipistrelle *Pipistrellus nathusii* and whiskered bat *Myotis mystacinus* in the north Tipperary. Ireland's only other regularly-occurring bat species – the lesser horseshoe bat *Rhinolophus hipposideros* – can occasionally be found on the Limerick – Tipperary border, but in general the county is just outside the range of this species.

Online national landscape suitability maps for Irish bat species (Lundy *et al.,* 2010) were reviewed using the Map Viewer of the National Biodiversity Data Centre. The suitability index for the 'all bats combined' layer varies across the length of the UWF Grid Connection. Areas of high suitability are found in the environs of Mountphilips at the western end of the UWF Grid Connection, moderate suitability and low suitability in the centre, and moderate suitability at the eastern end. Overall, the landscape suitability follows a consistent west to east pattern of decreasing habitat suitability for all species, with higher suitability in the agricultural pastures near Mountphilips, and lower suitability in the upland areas near Upperchurch Windfarm.

When considered at the level of individual bat species, the UWF Grid Connection Study Area has high suitability for common pipistrelles and natterer's bat; moderate suitability for soprano pipistrelles, Leisler's bat, whiskered bat, Daubenton's bat, and brown long-eared bats, and negligible suitability for Nathusius' pipistrelles and lesser horseshoe bats.

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

Further information on context such as known roosts identified from desktop review is included in Appendix 8.8: Bat & Non-Volant Mammals Data in Volume C4 EIAR Appendices.

Buildings with Suitability for Bats

Preliminary ecological appraisals were carried out for 69 buildings within 50m of the 110kV UGC route (there are no buildings within 50m of Mountphilips Substation). 38 No. of these buildings were of high or moderate roost suitability, and were considered for potential indirect effects (there is no potential for direct effects to roosts within buildings due to the location of 110kV UGC entirely within road pavements – i.e. no works or damage to buildings will occur). To facilitate the cumulative evaluation, it is presumed as worst-case scenario that bats are present at these locations.

Trees with Suitability for Bats

Crevices and cavities in mature trees can provide roosting opportunities for bats, with some species (e.g. Leisler's bat) thought to favour roosting sites in trees. Recent research has demonstrated that the use of roosts in trees can be highly transitory, with frequent roost switching between nights and across the season, although some large cavities can be used as maternity or hibernation roosts for longer periods of time. Almost all records to date have been from broadleaf trees (particularly oaks), with only a very small number from specimen conifers, and none from conifer plantations[37].

Mature trees within 50m of the UWF Grid Connection construction works area were inspected from ground level. At the Mountphilips Substation site 4 no. trees were considered to have low suitability for bats (e.g. small crevices that could be used by individual roosting bats), while 2 no. was considered to have moderate suitability (e.g. multiple or larger crevices that could support multiple roosting bats). Along the 110kV UGC on the public road network 4 no. trees were considered to have low suitability for bats. These trees are classified as having 'potential' for bats, following current BCT Best Practice guidelines (2016), as no presence/absence surveys have been undertaken. In addition, to facilitate the cumulative evaluation, it is presumed as worst-case scenario that bats are present at these locations. All other mature trees within 50m of the construction area boundaries were inspected and evaluated as having negligible roost suitability.

Bridges with Suitability for Bats

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

As the 110kV UGC will be installed over/under ca. 65 watercourse crossing structures (i.e. bridges and culverts), all structures along the route were inspected. It is noted that the development will cross 3 other watercourses at Mountphilips Substation site (giving a total of 68 watercourse crossings), but there are no existing structures (bridges or culverts) at these locations. Within the study area, 11 no. watercourse crossing structures (8 bridges and 3 culverts) had moderate suitability for roosting bats, 7 no. watercourse crossing structures (5 bridges and 2 culverts) had low suitability, and 47 had negligible suitability. However, it should be noted that these numbers only refer to the potential suitability of these structures for bats. Bridges with moderate suitability were surveyed by endoscope (with regard to Section 5.3 of the Bat Conservation Trust guidelines 2016) or bat detector survey to determine whether or not bats were using suitable structures. Bat roosts were recorded in two structures: bridges W33 and W44. Both were of a single soprano pipistrelle bat, and thus were considered to be day roosts / satellite roosts, which would be of negligible ecological value. Endoscope surveys were carried out for bridges with low suitability for bats, but no roosting bats were found.

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

Bat Activity surveys

Bat activity surveys, carried out in the mid-summer period (June-August 2016) and the autumn period (September-October 2016), using automated detectors were carried out at four locations near the Mountphilips Substation site and two locations near the consented UWF Substation. Activity levels (from six sampling locations) were relatively high, with an average of one bat pass every 2 - 3 minutes throughout the survey period (a Bat Activity Index of 23.4). The most frequently-recorded species were common pipistrelles, followed by soprano pipistrelles, *Myotis* spp. and Leisler's bat, in order of abundance. Lesser-horseshoe bats were not recorded. One of the sampling sites was considered to be of County Importance as a feeding areas / commuting route, four to be of Local Important, and one of Negligible Importance. The survey Sampling Locations are identified on Figure GC 8.8.1.

Table 8-62: Bat Activity Sampling Results

Sampling Location	Habitat	Month	Characterisation of activity	Importance Evaluation
SD1	Mature treeline	Jun	Frequent CP, occasional SP	Local
		Sept	Frequent CP, occasional SP & MY	
SD2	Hedgerow	Aug	Frequent CP	Local
		Sept	Occasional CP	
SD3	Hedgerow	Jun	Negligible	Local
		Sept	Frequent SP, occasional CP	
SD4	Hedgerow	Jun	Frequent CP, occasional SP	Local
		Sept	Occasional CP	
SD26**	Farmyard	Jun	Near-constant CP	County
		Sept	Occasional CP	
SD27**	Edge of conifer plantation	Jun	Occasional CP	Negligible
		Sept	Negligible	

*** It should be noted that sampling locations SD26 and SD27 are also within the zone of influence of the UWF Related Works, and are discussed in relation to same within Section 8.8.2.3.1 of this report.*

Maps showing the preliminary ecological appraisals of in respect of bats buildings, trees and bridges are provided in Figure GC 8.8. Further bat survey details and data are included in 8.8: Bat & Non-Volant Mammals Data in Volume C4 EIAR Appendices (Section A8.8.3).

8.8.1.3 Importance of Bats

All bat species, and their breeding / resting places, are legally protected in Ireland under the Wildlife Act 1976 (as amended in 2000). The Wildlife Act is the principal national legislation providing for the protection of wildlife and the control of activities which may adversely affect wildlife. For the purpose of the current evaluation, importance levels are as described under Context (above) in respect of both roosts and locations of activity.

All bats are listed on Annex IV of the EU Habitats Directive 92/43/EEC, which was transposed into national law through the European Communities (Natural Habitats) Regulations 1997 (S.I. 94/97) as amended in 1998 (S.I. No. 233/1998), 2005 (S.I. No. 378/2005) and 2011 (SI No. 477/2011). This legislation protects bats both inside and outside of the Natura 2000 site network. Furthermore, lesser horseshoe bat is listed on Annex II of the EU Habitats Directive 92/43/EEC which requires Special Areas of Conservation (SACs) to be designated within the Natura 2000 site network to ensure the maintenance of their conservation status.

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) ensures that governments take into account the conservation needs of species during the formulation of planning and development policies. It also seeks the protection of endangered species and in relation to bats, it stipulates that all bat species and their habitats are conserved.

8.8.1.4 Sensitivity of Bats

The key sensitivities of bats are the destruction or disturbance of their roosting places, and the modification of their commuting routes and foraging habitats (NPWS 2013, Collins et al., 2016).

During the day, bats roost in man-made structures (typically houses, farm buildings and bridges), mature trees, and caves. They can suffer direct effects due to the destruction or modification of their roosts (e.g. the demolition of a house or felling of a tree), or indirect effects due to disturbance of the area surrounding a roost (e.g. illumination of exit / entry points, or removal of surrounding vegetation). They are most sensitive to effects during their maternity and hibernation periods, which are from May to August and November to March, respectively.

After sunset, bats 'commute' from their roosts to a suitable feeding area, and spend most of the night foraging for insect prey. They typically favour linear habitat features (e.g. hedgerows and forest edges) for commuting and foraging, and usually avoid brightly-lit areas (Lundy et al., 2011). They may travel several kilometres from their roost, and may use different feeding areas on different nights.

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

Under Article 17 of the EC Habitats Directive (European Commission Directive 92/43/EEC), the Irish government is obliged to assess and report on the conservation status of all habitats and species listed in Annexes I, II, IV and V of the directive, including bats. In the latest submission (NPWS 2019), all Irish bat species are considered to be of favourable conservation status.Most bat species are listed as 'least concern' on the all-Ireland red list of mammals (Marnell et al., 2009), including the Nathusius' pipistrelle. Leisler's bat is listed as 'near-threatened' because Ireland supports an internationally-important population, but the overall population status of this species is known to be stable or increasing.

The abundance of Irish bats is monitored by Bat Conservation Ireland (Roche et al., 2012) using annual public surveys such as the 'Car-Based Monitoring Scheme', the 'All-Ireland Daubenton's Bat Waterways Survey', and roost monitoring assessments for brown long-eared bats and lesser horseshoe bats. In combination, these projects monitor all Irish species except Natterer's bat and whiskered bat. **To date the populations of all monitored species appear to be stable or increasing.**

If the development does not proceed, the site is expected to remain in the baseline condition and to be used by bat species on an occasional to regular basis. Based on the national trends of these species, the abundance of bats in the surrounding landscape is expected to remain stable, or to increase at a slow rate.

8.8.1.6 Receiving Environment (the Baseline + Trends)

As the conservation status of all Irish bat species is considered to be stable, it is expected that the baseline levels of bat activity will not change significantly by the time of construction of the project.

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8.8.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.8.2.1 Cumulative Evaluation Study Areas

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

The study is illustrated on Figure CE 8.8: UWF Grid Connection Cumulative Evaluation Study Area for Bats (Overview and Maps 1 to 2).

8.8.2.1.2 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 8.8.2.2.1 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 8-63 and illustrated on Figure WP 8.8: Whole Project Study Area for Bats (Overview and Maps 1 to 2) (Volume C3 EIAR Figures).

Table 8-63: Whole Project Cumulative Evaluation Study Area for Bats

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	• Buildings within 150m of Element construction works areas or activity locations • Mature trees within 50m of Element construction works areas or activity locations; • Hedgerow severance locations • Bridges within construction works locations or along concrete/aggregate haulage routes for Elements of the Whole UWF Project.	Professional Judgement and as per Best Practice: Bat Surveys for Professional Ecologists: Good Practice Guidelines, Collins, (2016), and The Conservation of Bats in Bridges Project – A Report on the survey and conservation of bat roosts in bridges in Cumbria, Billington and Norman (1997).
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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

The evaluation of cumulative impacts to Bats also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Bats with either the UWF 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 Cumulative Evaluations (Section A2.1.4.10).

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

8.8.2.2.1 Potential for Impacts to Bats

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Bats. The results of this evaluation are included in Table 8-64.

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

Table 8-64: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects due to no sources of impacts – During surveys, no bat roosts were recorded at the UWF Replacement Forestry lands, one low suitability feature was recorded within 150m of the existing entrance to the afforestation lands, • There is no potential for destruction or disturbance of bat roosts in trees, as there is no requirement to fell or prune trees for the UWF Replacement Forestry, no requirement to upgrade bridge structures, and no requirement for renovations, alterations or use of buildings during either the planting or growth stages, therefore there is no source of impact; • No potential for severance of commuting routes or feeding area, as there is no requirement to remove any hedgerows or other linear features for the UWF Replacement Forestry. Woodland edge habitat will be created for foraging bats, as the UWF Replacement Forestry matures; • No potential for disturbance effects due to lighting, as lighting will not be required for the UWF Replacement Forestry, • No potential for disturbance or displacement effects due to noise or vibration as no significant sources of noise and no sources of vibration will be present onsite during planting or management activities • No potential for mortality of bats due to collision due to the absence of moving structures, • No potential for effects due to harvesting, as the UWF Replacement Forestry will be a permanent woodland and will not be harvested.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects

Element 5: UWF Other Activities	Included for the evaluation of cumulative effects

8.8.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.8.2.3.1 Element 2: UWF Related Works

Online national landscape suitability maps for Irish bat species (Lundy *et al.,* 2010) were reviewed and indicate that the suitability index for the 'all bats combined' layer is moderate within the environs of UWF Related Works. When considered at the level of individual bat species, the UWF Related Works Study Area has high suitability for common pipistrelles; moderate suitability for soprano pipistrelles, Leisler's bat, Whiskered Bat and Natterer's bat, low suitability for Daubenton's and brown long-eared bats, and negligible suitability for Nathusius' pipistrelles and lesser horseshoe bats.

Field Survey Results – UWF Related Works Study Area:

In addition to desktop studies, field surveys were used to gather further information on bats in the UWF Related Works area, and comprised surveys of buildings, bridges, trees, and hedgerows and other linear features. Preliminary ecological appraisals were carried out for buildings, bridges and trees in order to determine their suitability for Bats. The methodology for determining the suitability of a building/bridge/tree for Bats is described in Section 8.1.8 of the Introductory section of Chapter 8.

Roosts in Buildings: Preliminary ecological appraisals were carried out in 2016 and 2017 of all buildings (35 no.) within the study area. All buildings were assigned a suitability category of negligible, low, moderate or high suitability, based on the age and condition of structural features used by roosting bats (e.g. roof tiles, attic spaces, soffit / fascia boards, walls). The aim of the assessments was to identify any buildings of high or moderate roost suitability that were at risk of direct or indirect effects, in order to identify priorities for further survey.

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

Four bat roosts were identified, all of which were located in dwelling houses and farm buildings. None of the roosts were located within the construction area boundaries. Two roosts are of County Importance, with the closest located 5m from the UWF Related Works construction works area. One roost is of Local importance, located 130m from the construction works area, and another is of Negligible importance.

Table 8-65: Identified Bat Roosts in the UWF Related Works study area

Code	Type	Evidence of bats	Valuation	Proximity to UWF Related Works construction works area boundary
BR14	Dwelling house	Day roost / satellite roost: 1 common pipistrelle	Negligible	15m
BR15	Dwelling house and traditional farm buildings	Maternity roost: 50 - 60 common pipistrelles Maternity roost: 5 soprano pipistrelles.	Local	130m
BR16	Dwelling house and traditional farm buildings	Maternity roost: 4 - 5 natterers bats. Transitional / mating roosts: 5 - 10 natterers bats, 20 common pipistrelles, 3 brown long-eared bats. Summer non-breeding / day roost: 2 common pipistrelles, 1 Leisler's bat. Hibernation roost: natterer's bats, common pipistrelles, Leisler's bat.	County	10m

Code	Type	Evidence of bats	Valuation	Proximity to UWF Related Works construction works area boundary
BR17	Dwelling house	Maternity roost: 2 – 3 natterers bats	County	5m

Roosts in Bridges

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

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

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

Roosts in Mature Trees

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

Activity

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

Activity levels were relatively high, with an average of one bat pass every three minutes throughout the survey period (a Bat Activity Index of 20.8). The only species recorded in significant numbers was the common pipistrelle; all other species had negligible activity. Lesser-horseshoe bats were not recorded. One habitat feature was considered to be of County Importance as a commuting route / feeding area.

Table 8-66: Bat Activity Sampling Results in the UWF Related Works study area

Site	Habitat	Month	Characterisation of activity	Ecological value
SD26	Farmyard	Jun	Near-constant CP	County
		Sept	Occasional CP	
SD27	Edge of conifer plantation	Jun	Occasional CP	Negligible
		Sept	Negligible	

8.8.2.3.2 Element 3: UWF Replacement Forestry

Not applicable –Element evaluated as excluded. See Section 8.8.2.2.1

8.8.2.3.3 Element 4: Upperchurch Windfarm

Preliminary ecological appraisals were carried out for 7 buildings within the study area, and presence / absence surveys and/or roost characterisation surveys were carried out in 2016 and 2017 for features of high or moderate roost suitability that were considered to be at risk of direct or indirect effects.

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One bat roost of County Importance is located within farm buildings at Site Compound No.2, which is associated with the Upperchurch Windfarm, and therefore overlaps the construction works area directly. A further day roost/satellite roost of negligible importance is also present 15m from the construction works area within another part of the Upperchurch Windfarm.

Table 8-67: Identified Bat Roosts in the Upperchurch Windfarm study area

Code	Type	Evidence of bats	Valuation	Proximity to Upperchurch Windfarm
BR14	Dwelling house	Day roost / satellite roost: 1 common pipistrelle	Negligible	15m
BR16	Dwelling house and traditional farm buildings	Maternity roost: 4 - 5 natterers' bats. Transitional / mating roosts: 5 - 10 natterers bats, 20 common pipistrelles, 3 brown long-eared bats. Summer non-breeding / day roost: 2 common pipistrelles, 1 Leisler's bat. Hibernation roost: natterer's bats, common pipistrelles, Leisler's bat.	County	0m

Activity

Activity surveys for the Upperchurch Windfarm were carried out by Malachy Walsh & Partners in 2012 and 2013, and the results were presented in the wind farm EIS. Some excerpts from the bat report are provided below:

"The results of bats surveys indicate that up to seven species of bat are utilising habitats within the study area or are commuting through the site to more suitable habitat in the greater area.

Throughout the site common pipistrelles and soprano pipistrelles were recorded on the edge of woodland, along access tracks, hedgerows, treelines, over areas of scrub, semi-natural grassland and improved agricultural grassland. Common pipistrelle was the most common species recorded during surveys in 2012 and 2013."

Consideration of the Passage of Time: the composition of suitable roosting and foraging habitat for bat species on the Upperchurch Windfarm site, has not materially changed since 2012/2013, and surveys for UWF Related Works confirmed continued usage of suitable habitats by bat species, of which pipistrelles remained the most abundant species. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this 2019 EIAR for UWF Grid Connection.

8.8.2.3.4 Element 5: UWF Other Activities

Due to the absence of possible sources of hedgerow severance in respect of UWF Other Activities (only minimal trimming of outer branches is planned) activity surveys to inform an appraisal of likely effects were not required

Roosts: No bat roosts were present. Trees at hedgerow trimming locations as part of Haul Route Activities are not suitable for roosting bats. No trimming is required for Overhead Line Activities.

8.8.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.8.2.1.

Biodiversity
Topic

8.8.3 PROJECT DESIGN MEASURES for Bats

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

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

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

The Project Design Measures outlined in Table 8-68 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Bats**.

Table 8-68: UWF Grid Connection Project Design Measures relevant to Bats

PD ID	Project Design Environmental Protection Measure (PD)
PD57	All excavation works will take place in line with protective measures required to avoid damage to trees during the construction phase of road projects, as stipulated in the NRA document 'Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub prior to, during and post construction of National Road Schemes'. This will include consultation with a qualified arborist, where appropriate to ensure works within the Root Protection Area (RPA) avoid any significant damage to tree roots. Exposed tree roots will be protected where required and excavation methods will be appropriately undertaken so as to avoid damage to RPA's. All excavation works in the RPA will be overseen by the Project Ecologist.
PD64	Tree felling only pertains to the Mountphilips Substation site. Confirmatory surveys will be carried out at all trees that will require felling or other major modifications (e.g. removal of rotten branches) in order to confirm the findings of the 2016 / 2017 surveys regarding the suitability of the trees for roosting bats. These trees will be subject to a ground-level visual inspection by the Project Ecologist (or a bat specialist acting on their behalf) prior to site clearance works.
PD65	While it is not expected that any trees with moderate or high suitability for roosting bats will be felled, the following measures will be implemented where a tree with moderate or high bat suitability is to be felled: a presence/absence bat surveys will be carried out; Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November. Trees with low suitability for bats will be felled carefully and slowly in order to avoid impact-related injuries to any bats that may be roosting inside them. Sections of the tree with potential roost features for bats (e.g. crevices, damaged branches) will be cut in sections, lowered carefully to the ground and left undisturbed for 48 hours before removal; and Where the felling of trees with bat suitability is carried out, robust, weather-proof bat-boxes, for example Schwegler type 1FF and 2F models, will be placed in each of the affected sections to compensate for the loss of potential tree roosts. The number of bat boxes will match the number of trees with bat suitability to be felled. Bat boxes will be placed on an exposed section of tree trunk at a minimum height of 4-5m, providing a clear space in front of the box for bats to enter and exit. Boxes will be placed in locations that will receive at least 6-7 hours of sunlight during summer months, and will be placed on the southern side of the tree. The Project Ecologist will supervise the installation of bat boxes in order to ensure that they are sited appropriately.
PD66	All bridges of moderate suitability for bats will be subject to a confirmatory survey prior to the commencement of construction works. Bridges of negligible or low suitability do not need to be surveyed, but this will be reviewed by the Environmental Clerk of Works and Project Ecologist. If a bat roost is found, the Project Ecologist will review the proposed works at that bridge, and determine whether there could be a risk of impacts on the roost. If there is a risk of impact on a bat roost in a bridge, the Project Ecologist will develop a case-specific mitigation strategy and apply to the NPWS for a derogation licence. Bats will be excluded from the bridge for the duration of construction works

	(typically only a few days), and replacement roosting opportunities (i.e. wall-mounted bat 'tubes' or boxes) will be provided at a suitable location nearby. When construction work is complete, bats will be able to return to their former roosting site.

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

8.8.4 EVALUATION OF IMPACTS to Bats

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

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

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

Table 8-69: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Destruction or disturbance of bat roosts in trees, (construction stage)	*Mortality through roost destruction of roosts in forestry or hedgerows, (construction stage)*
Destruction or disturbance of bat roosts in bridges, (construction stage)	*Destruction/Disturbance of Bat Roosts in Buildings, (construction stage)*
Severance of commuting routes or feeding areas, (construction stage)	*Disturbance or Displacement of Bat Roosts due to Noise and Vibration, (construction stage)*
Disturbance or Displacement due to lighting, (construction stage)	*Inadvertent mortality through roost destruction due to hedgerow trimming activities (operational stage)*
	Avoidance due to increased EMF (operational stage)
	Disturbance or Displacement due to lighting (operational stage)
	Disturbance or Displacement due to Noise and Vibration (operational stage)
	Mortality of bats due to collision or barotrauma (operational stage)
	Inadvertent mortality through roost destruction, (decommissioning stage)
	Disturbance or Displacement due to lighting, (decommissioning stage)
	Indirect Disturbance from Noise and Vibration, (decommissioning stage)

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 8.8.4.1 to 8.8.4.4.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, Section 8.8.4.5.

8.8.4.1 Impact Evaluation Table: Destruction or disturbance of bat roosts in trees

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Removal of mature trees, trimming and pruning of mature trees and hedgerows
Cumulative Impact Source: Tree felling, Trimming and pruning of mature trees and hedgerows
Impact Pathway: Landcover

Impact Description: Crevices and cavities in mature trees can provide roosting opportunities for bats, and some species (e.g. Leisler's bat) are thought to favour roosting sites in trees. Recent research has demonstrated that the use of roosts in trees can be highly transitory, with frequent roost switching between nights and across the season, although some large cavities can be used as maternity or hibernation roosts for longer periods of time. Almost all records to date have been from broadleaf trees (particularly oaks), with only a very small number from specimen conifers, and none from conifer plantations[38].

Any damage or disturbance to trees with crevices or cavities can have direct or indirect impacts on any bats that may be roosting within them. Felling can cause death or injury to bats, or the associated disturbance can cause them to emerge during daylight, thus exposing them to diurnal predators. Similarly, construction work within the root zone of trees can damage the tree, potentially causing the tree to fall at a later date. The spatial extent of impacts is limited to the tree in question (including its root zone and overhanging branches).

Impact Quality: Negative

Evaluation of Subject Development Impact – Destruction or disturbance of bat roosts in trees

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
In total, at the Mountphilips Substation site, 2 no. trees of moderate suitability and 4 trees of low suitability were recorded -1 of moderate suitability, and 2 of low suitability occur at the permanent site entrance for Mountphilips Substation on the L2166-10 road; 1 tree with low bat suitability located within 50m of the Mountphilips Substation compound construction works area boundary; 1 tree of low bat suitability occurs north of the new end masts; and 1 tree of moderate bat suitability south of the new end masts.

Outside of the Mountphliips Substation site, 4 other trees (all low bat suitability) are recorded along the 110kV UGC route along the R503.

Only 1 tree with moderate suitability will require fellng, this tree is located at the Mountphilips Substation site entrance. 2 low suitability trees will also be felled at this location. All of these trees were visually inspected between 2016 - 2019, and no evidence of roosting bats was observed, so it is considered that there is a low likelihood (e.g. <5%) that bats would be roosting within them at the time of construction. A number of project design measures have been incorporated into the development (PDs 57, 64 and 65), which include pre-construction surveys of trees, sensitive felling procedures, and the provision of alternative roosting opportunities.

No trees will be felled along the 110kV UGC route (i.e. outside of the Mountphilips Substation site), because works for the 110kV UGC will only occur within the paved surfaces of roads. Project Design measures will ensure that the roots of any of these trees are protected during construction works and that any damage to the roots of these trees is minimised.

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

There is no potential for sequential effects to bats, as the extent of any instance of roost disturbance/destruction is limited to those Bats which may be present in individual trees. cut

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Only 1 tree of moderate suitability is within the zone of effect, located at the Mountphilips Substation site entrance. A number of project design measures are outlined in Section 8.8.3, which will ensure that no bats are roosting in the tree at the time of works, thus preventing an impact.
- The other 2 trees at the Mountphilips Substation site entrance have low suitability for bats, and the likelihood that bats would occupy any of these trees at the time of felling is considered to be low (<5%). The project design measures listed in Section 8.8.3 will also apply for these trees.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is no potential for cumulative effects with the Other Elements of the Whole UWF Project due to separation distance - all trees with suitability for bats, which could be affected by the UWF Grid Connection, are located at the proposed Mountphilips Substation site in western portion of study area,, and none were recorded at the eastern end of the 110kV UGC route in the Knockmaroe/Knockcurraghbola area. Therefore, there is a separation distance of c.22km between the Mountphilips Substation site and the UWF Related Works and Upperchurch Windfarm sites.

Significance of the Impact: No cumulative impact

Rationale for Impact Evaluation:

- Separation distance between trees within the UWF Grid Connection zone of impact and the zone of impact of the Other Elements.

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

Element 2: UWF Related Works

Impact Magnitude:
There are no trees which have suitability for roosting bats within 50m of UWF Related Works, and therefore bat roosts within 50m of the works are not expected to exist. Therefore, there is no potential for cumulative impacts.

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- No trees with bat roost suitability within 50m of UWF Related Works construction works areas;
- No change in baseline conditions

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.8.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:

No potential tree roosts were identified in the EIS for the Upperchurch Windfarm and it was noted that the conifer plantations within the site offer "*very poor roosting habitat*".
In the RFI reporting it was noted that "*large mature treelines in the greater area offer potential roosting sites for bats particularly along the roads in Shevry and Gleninchnaveigh*". However, only a small number of trees will be felled along these roads, and none were considered to have suitability for bats. Therefore, this element of the project will not have any direct impact on potential tree roosts.

Significance of the Impact: Neutral Impact

Topic: Biodiversity

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Rationale for Impact Evaluation: • None of the trees within the footprint of the development are suitable for roosting bats, so there will be no change to the baseline conditions
Element 5: UWF Other Activities
Impact Magnitude: There is no requirement to fell trees. Trimming of hedgerows and low-hanging branches of trees will be required along some roads as part of UWF Other Activities. Haul Route Activity locations are on public roads and already subject to the standard maintenance regime for public roads, and it is expected that all such hedgerows / trees would have been trimmed in the past. Therefore, there is a negligible risk that bats could roost in any of these branches. No tree or hedgerow trimming is required for Overhead Line Activities. Significant planting of new trees will occur as part of the Upperchurch Hen Harrier Scheme (totalling 2.8km).
Significance of the Impact: Neutral Impact
Rationale for Impact Evaluation: • None of the trees within the footprint of the development are suitable for roosting bats, so there will be no change to the baseline conditions • Trimming associated with Haul Route Activity locations will not contrast with any baseline activities, and; • Tree planting in respect of the Upperchurch Hen Harrier Scheme will increase availability of trees for Bats.
Evaluation of Other Cumulative Impacts – Destruction or disturbance of bat roosts in trees
Whole UWF Project Effect
Cumulative Impact Magnitude: There is no potential for cumulative whole project effects to Bats, because the impacts of the UWF Grid Connection will be imperceptible. The Other Elements of the Whole UWF Project do not include trees suitable for roosting bats, and trimming activities on public roads as part of UWF Other Activities will have Neutral effect on bat roosts, in addition the separation distance between the trees at the Mountphilips Substation site and the Other Elements reduces any potential for cumulative impacts between UWF Grid Connection and the Other Elements. There is no potential for cumulative sequential effects; as the extent of any instance of roost disturbance/destruction is limited to those Bats which may be present in individual trees.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • The UWF Grid Connection will have an imperceptible impact, the Other Elements will be Neutral • The separation distance of the works at Mountphilips to the Other Elements

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

8.8.4.2 Impact Evaluation Table: Destruction / disturbance of bat roosts in bridges

Impact Description	
Project Life Cycle Stage:	Construction Stage/early Operational Stage

Impact Source: Trenching works for the 110kV UGC, and works to parapet walls
Cumulative Impact Source: None
Impact Pathway: physical disturbance / vibration

Impact Description: Bats can roost in crevices and cavities underneath bridges, particularly in features of traditional stone construction. Modern bridges and culverts rarely have any crevices or cavities, and thus are usually unsuitable for roosting bats.

Impact Quality: Negative

Evaluation of Subject Development Impact – Destruction / disturbance of bat roosts in bridges

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
The UWF Grid Connection 110kV UGC will cross a number of bridges and culverts, all within the existing road foundations. Roosts of single soprano pipistrelle bats were recorded in 2019 in two of the bridges (W33 and W44), and nine other structures (at W7, W18, W23, W28, W36, W41, W43, W49 and W53) were considered to have moderate suitability for bats.

At two locations (W8 and W9) the cable will be installed underneath the bed of the bridge by horizontal directional drilling. There is no potential for impacts on Bats at these two bridges, because directional drilling will avoid the need for any construction work (e.g. trenching) at the bridge.

At the locations in which the cable trench for 110kV UGC will be installed within the existing road pavement over the bridge, there is a risk that bats could be affected. Direct impacts may occur if Bats occupied any crevices or cavities underneath the bridge that were uncovered (from above) during trenching works. Indirect impacts could occur if vibration from construction works caused bats to abandon their roost.

For the two known roosts (W33 and W44), the 110kV UGC will be installed within the road pavement over the bridges. Both locations are day roosts / satellite roosts of single soprano pipistrelles (a very common species in Ireland), which are considered to be of Negligible Importance. Nonetheless, all bats receive legal protection under the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) and the Wildlife Act 1976 (as amended). Nine other bridges were considered to have moderate suitability for bats, but no bats were found to be roosting in these structures (W7, W18, W23, W28, W36, W41, W43, W49 and W53) in 2019. A project design measure has been incorporated into the development (PD66), which includes pre-construction surveys of bridges, exclusion procedures and the provision of alternative roosting opportunities under derogation from NPWS.

In relation to bridges under material haulage routes, no works are required to upgrade the integrity of any water crossing structures along haulage routes for UWF Grid Connection. These bridges are already used by large vehicles on a regular basis, so the passage of construction vehicles would not represent a change from the baseline condition.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Two bat roosts could be directly or indirectly affected, both of which are of Negligible Importance;
- The destruction or disturbance of a bat roost would constitute a legal offence, thus any exclusion procedures will be carried out under derogation from NPWS.

Topic: **Biodiversity** | Sensitive Aspect: **Bats**

- The application of project design measures listed in Section 8.8.3, which include bridge surveys (and the exclusion of bats, if required) before works over a bridge commences.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is no potential for cumulative impacts to any of the bridges/culverts along the 110kV UGC with any Other Element, as no works are required by any Other Element to any of these structures, and the 2 culverts which will be widened as part of UWF Related Works (Haul Route Works) have negligible bat suitability

Significance of the Impact: No Cumulative Impact

Rationale for Impact Evaluation:

- separation distance between trenching works over bridges for UWF Grid Connection and no work required to any bridge or crossing with bat suitability for any Other Element

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

Element 2: UWF Related Works

Impact Magnitude:

The 2 no. culverts which require extension for Haul Route Works have negligible suitability for roosting bats. No works are required to upgrade the integrity of structures along haulage routes for UWF Related Works. These bridges are already used by large vehicles on a regular basis, so the passage of construction vehicles would not represent a change from the baseline condition.

In relation to material haulage routes, there is no potential for cumulative effects to the bridges and culverts under the Regional Road R503 and along the local road network from Knockmaroe to the Consented UWF Substation locations. No works are required to any of these bridges to facilitate the delivery of materials/components, and these bridges are already used by large vehicles on a regular basis, so the passage of construction vehicles would not represent a change from the baseline condition.

Significance of the Impact: No Likely Impact

Rationale for Impact Evaluation:

- negligible suitability of 2 culverts for roosting bats, in the context of works to these culverts relating to a short extension (concrete pipe) to the existing concrete pipe
- the daily use of bridges under haulage routes by HGVs, with no works required.

Element 3: UWF Replacement Forestry– *N/A, evaluated as excluded, see Section 8.8.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:

There are no bridges within the Consented Upperchurch Windfarm site, and no works are required to upgrade the integrity of structures along haulage routes for the windfarm. These bridges are already used by large vehicles on a regular basis, so the passage of construction vehicles would not represent a change from the baseline condition.

Significance of the Impact: No likely Impact

Rationale for Impact Evaluation:

- No bridges within the windfarm site
- the regular use of bridges under haulage routes by HGVs, with no works required.

Element 5: UWF Other Activities

Impact Magnitude:

No magnitude: No bridge upgrade works are proposed for this element
Significance of the Impact: No likely Impact
Rationale for Impact Evaluation: • no works to bridges associated with UWF Other Activities
Evaluation of Other Cumulative Impacts – Destruction / disturbance of bat roosts in bridges
Whole UWF Project Effect
Cumulative Impact Magnitude: The only element of the Whole UWF Project that could potentially have impacts on bat roosts in bridges is the UWF Grid Connection (where the 110kV UGC will be constructed over 11 no. existing watercourse crossing structures which have moderate suitability for roosting bats). Duration of works will be 1 to 2 days at these locations, in the context that the roosts were evaluated as having Negligible importance. Project Design measures, which are part of the UWF Grid Connection development, will include pre-construction surveys of all bridges of moderate suitability, and the exclusion of bats before work.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • Two bat roosts of Negligible Importance could be directly or indirectly affected by the UWF Grid Connection • No other element will have an impact on bat roosts in bridges

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

Bats

Sensitive Aspect

8.8.4.3 Impact Evaluation Table: Severance of commuting routes or feeding areas

Impact Description	
Project Life Cycle Stage:	Construction Stage/early Operational Stage

Impact Source: Site clearance
Cumulative Impact Source: Site clearance
Impact Pathway: Land cover

Impact Description: Bats forage and commute along hedgerows, treelines and other linear habitat features. Both temporary and permanent clearance of short sections of habitats such as Hedgerows will be required to facilitate some construction works, particularly along the route of the new permanent access road to Mountphilips Substation. The removal of this habitat would not kill or injure any bats, but it may disrupt their behaviour, reducing the value of regular feeding areas and forcing bats to use alternate commuting routes. In many cases bats will be able to adapt to an altered route, as many bat species (e.g. pipistrelles) readily cross gaps of 5 - 10m. However, the disruption of key feeding areas or commuting routes may have a significant effect. For example, alteration of the key commuting routes to and from bat roosts can potentially cause bats to permanently abandon the roost.

Re-instated hedgerows will be planted at the Mountphlilps Substation site entrance with semi-mature (locally sourced, native) trees, thus reducing the time required for re-establishment to original vegetation height. Therefore, the effects of vegetation removal would only persist in the short term (approx. 1 – 7 years), and after this period, the hedgerows would return to the baseline condition. It is also noted that UWF Grid Connection and Other Elements of the Whole UWF Project will include substantial Hedgerow planting, resulting in a net increase in the coverage of this habitat within the study area.

Impact Quality: Negative and Positive

Evaluation of Subject Development Impact – Severance of commuting routes or feeding areas

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
10 to 15m sections (40m in total) of hedgerow will be permanently removed at 3 locations along the new permanent access road to Mountphilips Substation. These hedgerows are evaluated as of local importance to bats. 700m of hedgerow will be planted along each side of the new access road.

In addition, approximately 160m of roadside boundary (comprising of 17 immature trees, 1 mature tree and earthen banks) will be permanently removed at the main site entrance to Mountphilips Substation to provide sufficient sightlines for the safety of road users on the public road, although the roadside boundary will be replacedwith an equivalent length of new hedgerow and equivalent number of semi-mature trees behind the new sightlines.

No hedgerow removal is required for the 110kV UGC which is routed entirely along paved roads (predominantly public roads with one short length of private paved road).

No hedgerow removal is required near the consented UWF Substation. One of the sampling points at this location has bat activity of County Importance, but this will not be affected by the UWF Grid Connection.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Only a small extent of hedgerow (40m) will be permanently lost, and;
- 700m of additional hedgerow planting will more than compensate for its loss.

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Topic

Element 1: UWF Grid Connection – cumulative impact
Cumulative Impact Magnitude: No cumulative impact: There is no potential for cumulative effects with the Other Elements of the Whole UWF Project because all hedgerow severance and new hedgerow planting for the UWF Grid Connection will occur at the Mountphilips Substation area, which is c.22km linear separation distance from any of the Other Elements
Significance of the Impact: No cumulative effect
Rationale for Impact Evaluation: • Separation distance between hedgerows subject to temporary or permanent removal.
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: 10m sections of field boundary will be permanently removed at two locations along Realigned Windfarm Road RWR2. However, these areas are un-vegetated, so they are not considered to be of importance for commuting or foraging bats. 145m of linear vegetation features (primarily hedgerows) will be removed temporarily (c.1 week to 1 month) at 15 locations along works locations for the Internal Windfarm Cabling and for Haul Route Works (HW7 and HW10). Temporary bat crossing structures will be installed at severed hedgerows or field boundary proximal to areas of either high Bat activity or roost locations, in order to avoid severance effects during works. When complete, all temporarily removed hedgerows or field boundaries will be reinstated.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • Only a small extent of hedgerow will be permanently lost. • 370m of additional hedgerow planting alongside RWR2; and • All temporarily-removed field boundaries will be reinstated to at least their former (or better) condition in the medium term, as outlined in Chapter 5 Description of the Development; • The severance of most commuting routes / feeding areas will be medium term in duration, reversible and offset by the planting of new hedgerows; • There will be a lag time in the re-establishment of the vegetation, but the continuity of linear features near bat roosts will be maintained using specially-designed bat crossing structures; • This will ensure that bats can continue to use these features during the re-establishment period.
Element 3: UWF Replacement Forestry– *N/A, evaluated as excluded, see Section 8.8.2.2.1*
Element 4: Upperchurch Windfarm
Impact Magnitude: There will be a loss of potential foraging habitat within the site. However, this loss of habitat is not considered to be significant given the availability of extensive foraging habitat outside the site. In the Ecological Management Plan for the development it is noted that "*approximately 360m of new hedgerow will be planted to mitigate this loss of habitat*."
Significance of the Impact: Not significant
Rationale for Impact Evaluation: • The extent of permanent loss is mitigated by the planting of the same extent of replacement habitat; and • Relatively little bat activity was recorded along hedgerow habitats.
Element 5: UWF Other Activities
Impact Magnitude:

Bats

Sensitive Aspect

This element of the project will not involve the severance of any hedgerows or similar features. As part of Upperchurch Hen Harrier Scheme management up to 2.8km of hedgerow is to be planted, constituting a significant offset of Upperchurch Windfarm hedgerow removal in terms of the effects of severance
Significance of the Impact: Imperceptible (positive)
Rationale for Impact Evaluation: • No hedgerows or other similar features will be severed, so there will be no change to the baseline conditions, • 2.8 km of new hedgerow planting will improve bat foraging habitat in the short to medium term.
Evaluation of Other Cumulative Impacts – Severance of commuting routes or feeding areas
Whole UWF Project Effect
Cumulative Impact Magnitude: Only some short sections of field boundary will be permanently affected: 3 sections of hedgerow of 10 to 15m length (totalling 40m) at Mountphilips Substation (UWF Grid Connection), and the hedgerow / field boundaries at UWF Related Works locations. Bat crossing structures will be installed at UWF Related Works locations proximal to identified bat roosts or areas of high foraging activity, which will ensure that linear connectivity is maintained during this period. When construction is completed, all of these hedgerows or field boundaries will be reinstated to at least their former (or better) condition using semi-mature plants. The provision of these structures will avoid sequential effects on foraging bats in instances where hedgerow severance locations occur within the zone of effect of multiple project elements. At the Upperchurch Windfarm site an additional 360m of hedgerow will be removed in Shevry. In addition, several elements of the Project will involve hedgerow planting, as follows: the Upperchurch Hen Harrier Scheme will incorporate 2.8 km of new hedgerows, and additional hedgerows will be planted as part of the UWF Grid Connection (700m of new hedgerow), UWF Related Works (370m of new hedgerow) and Upperchurch Windfarm (360m as mitigation for loss of suitable hedgerows).
Significance of the Cumulative Impact: Not Significant
Rationale for Cumulative Impact Evaluation: Only a small extent of hedgerow will be permanently lost. Additional hedgerow planting will more than mitigate for its loss; All temporarily-removed field boundaries will be reinstated to at least their former (or better) condition in the medium term; The severance of most commuting routes / feeding areas will be short term in duration, reversible and offset by the planting of semi-mature trees and shrubs on a like-for-like basis; and The continuity of important bat commuting routes will be maintained using specially-designed bat crossing structures.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

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8.8.4.4 Impact Evaluation Table: Disturbance or Displacement due to Lighting

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Artificial lighting
Cumulative Impact Source: Artificial lighting
Impact Pathway: Visibility

Impact Description: Bats are nocturnal animals, and typically avoid any source of natural or artificial light. Lighting in the vicinity of bat roosts can cause roost abandonment, reduction in numbers of individuals, and reductions in juvenile growth rates. In addition, lighting near hedgerows and other semi-natural habitats can form barriers to the movement of commuting bats, and displace bats from feeding areas.

Construction work will take place during daylight hours as part of Project Design, so it will not be necessary to use artificial lighting at construction works areas. However, lighting will be required for security reasons at the temporary construction compound at the Mountphilips Substation site. Security lighting will be used at the temporary compound at Mountphilips Substation site. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational. (Project Design Measure).

Impact Quality: Negative

Evaluation of the Subject Development Impact – Disturbance or Displacement due to Lighting

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
1 No. Temporary compound at the Mountphilips Substation will be used over a 12 – 18 month period, and will be fitted with lights. The spatial extent of any disturbance or displacement effects will be small, due to the use of cowls: it would be directed towards the key areas required for security, and may illuminate an area of 10 - 20m from the light source. Lights will not be directed towards any bat roosts or key commuting routes / feeding areas. As lighting will be fitted with motion and time sensors, all lighting will be of momentary duration, typically only for approx. one minute for each time that the sensor is triggered.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The use of cowling will prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition.
- Any lighting that is required would only be temporarily active, and would not be operational throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: No potential for cumulative effects, due to the separation distance (c.23km) between the temporary compound at the Mountphilips Substation and the temporary compound (for UWF Related Works and Upperchurch Windfarm) in Shevry. The works for the 110kV UGC will be carried out during daylight hours with no requirement for lighting, therefore there is no potential for cumulative effects from 110kV UGC works.

Significance of the Impact: No cumulative effect

Rationale for Impact Evaluation:

- Lighting for the UWF Grid Connection will be of very limited spatial and temporal extent – limited to the Mountphilips Substation compound area.

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- Separation distance between sources of light for UWF Grid Connection (Mountphilips Substation) and the sources for the Other Elements (Site Compound No. 1 at Upperchurch Windfarm).

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

Element 2: UWF Related Works

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

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

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

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.8.2.2.1.*

Element 4: Upperchurch Windfarm

Impact Magnitude:
All lighting within compounds will be cowled towards the centre of the compound.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The use of cowling will prevent light spillage so there will be no change to their baseline condition.
- Any lighting that is required would only be temporarily active, and would not be operational throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration.

Element 5: UWF Other Activities

Impact Magnitude:
No artificial lighting is proposed for this element of the project.

Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:

- No artificial lighting will be required, so there will be no change to the baseline conditions

Evaluation of Other Cumulative Impacts – Disturbance or Displacement due to Lighting

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Lighting will be used at Mountphilips Substation compound, and at the Upperchurch Windfarm Site Compound No.1 (in Shevry) during construction of the Whole UWF Project. As noted above, measures on lighting have been incorporated into the Project design in order to minimise the effects on bats. This will include the fitting of cowls to all lights in order to minimise light spill, and the use of motion and time sensors to minimise the amount of time the lights are operational. Lights will not be left on overnight. In addition, lighting will be required for 12 – 18 months in any location, and the spatial extent is expected to be of no more than 20m from the light source. These measures, along with the separation distance between compounds (c.23km) will also prevent any sequential effects on roosting or foraging bats from multiple aspects of the Whole UWF Project.

Although there are some bat roosts and commuting routes / feeding areas in the vicinity of the UWF Related Works, consented Upperchurch Windfarm and the UWF Grid Connection, the proposed project design measures ensure construction activities are carried out during daylight hours which will prevent the illumination of these areas.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • The use of cowling will prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition. Any lighting that is required would only be temporarily active, and would not be operational throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration. • Construction works will be carried out during daylight hours.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

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8.8.4.5 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-70 below.

Table 8-70: Description and Rationale for Excluded Impacts to Bats

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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Forestry Felling	2, 4, 5	Landcover	Mortality through roost destruction	Evaluated as Excluded: No potential/no likely impact No forestry felling is required for UWF Grid Connection. In relation to UWF Related Works and Upperchurch Windfarm: No likely effect, as homogenous conifer plantations have extremely limited potential or suitability for roosting bats. In relation to UWF Other Activities: No likely effect due to the absence of possible sources of hedgerow severance in respect of UWF Other Activities, no bat roosts were present and the trees at hedgerow trimming locations as part of Haul Route Activities are not suitable for roosting bats. No trimming is required for Overhead Line Activities.
Hedgerow Trimming	1,2, 4,5	Landcover	Inadvertent mortality through roost destruction	Evaluated as Excluded: No likely impact, as any trimming will only the removal of outer edges of branches which are unsuitable for Bats
Land cover Change	1,2, 4,5	Renovation/alteration of Buildings	Destruction/Disturbance of Bat Roosts in Buildings	Evaluated as Excluded: No potential/no likely impact: The UWF Grid Connection will not involve any demolition or alterations of any buildings. Upperchurch Windfarm: an unoccupied dwelling house and associated outbuildings (Roost #16) will be used as a site office for the Upperchurch Windfarm. The use of the site office for welfare facilities will be very similar to its original use as a dwelling house. There will be no renovations of the exterior or interior of the building. No permanent or fixed lighting will be installed around the exterior of the property, and shutters or blinds will be used to prevent light spill from windows on the northern side which faces towards identified roosts. The outbuildings will not be used for storage. Given the above, there is a low probability that the change of use would have direct or indirect impacts on any bat roosts, and the magnitude and spatial extent of impacts is considered to be negligible, because: (i) there will be no destruction or disturbance of any of the bat roosts in these structures; and (ii) there will be no new artificial lighting near any roost exit / entry

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Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				points; therefore, there will be Neutral effects on the bat roost. A derogation licence will not be required. UWF Related Works will not use this unoccupied house, and therefore has no potential to cause effects to roosting bats. UWF Grid Connection will not use this Site Office during construction or operation.
Noise and Vibration	1,2,4,5	Air	Disturbance or Displacement of Bat Roosts due to Noise and Vibration	Evaluated as Excluded: Neutral Effect: Bats are not known to be particularly sensitive to noise and / or vibration; this pathway for impacts is not discussed in any British or Irish guidelines. As there will be no construction works at night, there is no risk of noise or vibration impacts on foraging or commuting bats. Although there are some bat roosts within 10m, construction works will be in close proximity to these roosts for no more than a half a day at any location. It is predicted that construction-related vibration will be approx. 0.5 to 1 mm/s within a zone of influence of approx. 5m. This would be barely perceptible to any human residents of properties, and therefore is also considered barely perceptible to any bats occupying a roost. Therefore, the magnitude of impacts reaching any bat roosts will be imperceptible.
Operational Stage				
Hedgerow Trimming	2, 5	Landcover	Inadvertent mortality through roost destruction	Evaluated as Excluded: No likely impact, as any trimming will only the removal of outer edges of branches which are unsuitable for Bats
EMF	1,2, 4	Air	Avoidance due to increased EMF	Evaluated as Excluded: No likely effects, as literature supports no precedent for this as a viable impact.
Artificial Lighting	1, 4	Visibility	Disturbance or Displacement due to lighting	Evaluated as Excluded: Neutral impact, as the only locations with operational lighting (substations, wind turbines) will incorporate bat-sensitive lighting (cowled, motion sensor and timer controlled) as part of the project design.
Noise and Vibration	1,2, 4,5	Air	Disturbance or Displacement due to noise/ vibration	Evaluated as Excluded: Neutral impact, as there will be no significant noise or vibration during the operational phase.
Above ground structures	1,2,4	Physical contact	Mortality of bats due to collision or barotrauma	Evaluated as Excluded: No likely effect and no potential for cumulative impacts with Upperchurch Windfarm. As per the 2014 ABP Inspectors Report, it was assessed that no significant impact to bats were likely to occur. There would be no potential for cumulative impacts with other project elements, as follows:

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Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				UWF Grid Connection: no likely impact with the Mountphilips Substation, all other parts are either underground or at ground level (i.e. new roads), UWF Related Works: no likely impact with the Telecom Relay Pole, due to the immobility of this structure.
Decommissioning Stage				
Hedgerow Trimming	1,2, 4,5	Landcover	Inadvertent mortality through roost destruction	No potential for effects as the UWF Grid Connection will not be decommissioned. In relation to the UWF Related Works or Upperchurch Windfarm trimming activities, if they occur, will only involve the removal of outer edges of branches which are unsuitable for bats. UWF Other Activities, if they occur, will only involve the removal of outer edges of branches which are unsuitable for bats
Artificial Lighting	1,2, 4	Air	Disturbance or Displacement due to lighting	No potential for effects, the UWF Grid Connection will not be decommissioned. In relation to the UWF Related Works or Upperchurch Windfarm, no potential for effects as there will be no requirement for lighting during decommissioning works
Noise and Vibration	1,2, 4	Air	Indirect Disturbance from Noise and Vibration	No potential for effects, the UWF Grid Connection will not be decommissioned. In relation to the UWF Related Works or Upperchurch Windfarm, no likely effects due to the small scale of decommissioning works or activities, with all work taking place from roads and turbine hardstands, so no potential to generate significant noise or vibration.

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8.8.5 Mitigation Measures for Impacts to Bats

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

8.8.6 Evaluation of Residual Impacts to Bats

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Bats above (Section 8.8.4) – i.e. **no significant adverse impacts**.

8.8.7 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 a Invasive Species Specialist.

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8.8.8 Summary of Impacts to Bats

A summary of the Impact to Bats is presented in Table 8-71.

Table 8-71: Summary of the impacts to Bats

Impact to Bats:	**Destruction or disturbance of bat roosts in trees**	**Destruction or disturbance of bat roosts in bridges**	**Severance of commuting routes or feeding areas**	**Disturbance or Displacement due to Lighting**
Evaluation Impact Table	*Section 8.8.4.1*	*Section 8.8.4.2*	*Section 8.8.4.3*	*Section 8.8.4.4*
Project Life-Cycle Stage	Construction	Construction	Construction /Early Operation	Construction
UWF Grid Connection *Direct/indirect impact*	**Imperceptible**	**Imperceptible**	**Imperceptible**	**Imperceptible**
UWF Grid Connection *Cumulative impacts*	**No Cumulative Impact**	**No Cumulative Impact**	**No Cumulative Impact**	**No Cumulative Impact**
Element 2: UWF Related Works	Neutral	No Likely Impact	Imperceptible	Imperceptible
Element 3: UWF Replacement Forestry	No Potential for Impact Evaluated as Excluded – see Section 8.8.2.2.1			
Element 4: Upperchurch Windfarm	Neutral	No Likely Impact	Not Significant	Imperceptible
Element 5: UWF Other Activities	Neutral	No Likely Impact	**Imperceptible (positive)**	Neutral
Cumulative Impact:				
All Elements of the Whole UWF Project	Imperceptible	Imperceptible	Not Significant	Imperceptible

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

Note: No cumulative information for Other Projects or Activities is included in the table above, as no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

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8.9 Sensitive Aspect No.8: Non-Volant Mammals

This Section provides a description and evaluation of the Sensitive Aspect - Non-Volant Mammals.

Donncha O Cathain, Jennifer Pearson, Chris Cullen and Howard Williams were the main authors of this Section. Please see Sources of Informaiton (Section 8.1.7) and Methodology (Section 8.1.8) for details of the desktop and fieldwork surveys which have informed the evaluation of Aquatic Habitats & Species.

8.9.1 BASELINE CHARACTERISTICS of Non-Volant Mammals

8.9.1.1 STUDY AREA for Non-Volant Mammals

The study area for Non-Volant Mammals in relation to the UWF Grid Connection is described in Table 8-72 and illustrated on Figure GC 8.9: UWF Grid Connection Study Area for Non-Volant Mammals (Overview and Maps 1 to 2) (Volume C3 EIAR Figures).

Table 8-72: UWF Grid Connection Study Area for Non-Volant Mammals

Study Area for Non-Volant Mammals	Justification for the Study Area Extents
Otter: All watercourse crossing locations were surveyed for suitability, and where suitable habitat occurred (26 No.) these watercourses were surveyed 300m in both direction Badger and Other Mammals: construction works area plus 50m in all directions	Professional Judgement and as pertinent: Otters: Best Practice guidelines published by the Highways Agency (1999) Badgers: Best Practice guidelines published by the NRA (2005) Other mammal species professional judgement and as per Best Practice (CIEEM, 2016).

8.9.1.2 Baseline Context and Character of Non-Volant Mammals in the UWF Grid Connection Study Area

The principal habitats within the context of Non-Volant (non-flying) Mammals include open grassland and bogs which provides foraging habitat, and coniferous and deciduous forestry, mixed woodland, hedgerows, and scrub, which provide shelter and provide locations for breeding and resting.

Baseline surveys of the UWF Grid Connection recorded evidence of Otter *(Lutra lutra),* Badger *(Meles meles),* Fox *(Vulpes vulpes)*, Pine Martin (Martes martes), Deer species, Rat *(Rattus Norvegicus)* and Squirrel species within the study area, however limited evidence of breeding or resting sites is present, primarily due to the placement of the majority of work locations within the public road. No active breeding or resting sites for Badger (setts) or Otter (Couches and/or holts) are present within the UWF Grid Connection Study Area. Opportunities for breeding Pine Marten may occur in some of the buildings which occur within the UWF Grid Connection study area.

At the Mountphilips Substation site evidence of Badger, Squirrel, Deer and Fox were recorded. Recorded Badger evidence consisted of prints and latrines (scat). No setts were recorded at the Mountphilips Substation site.

Along the 110kV UGC route outside of the Mountphilips Substation site, evidence of mammals is limited to 18 mammal pathways/mammal runs, which is typical evidence of roadside usage. The small number of records is attributed to the generally busy nature of the roads on which the route of the 110kV UGC is located. A total of seven burrows were recorded within 50 metres of the 110kV UGC route. Three of these burrows were inactive or infrequently used. The species using these burrows could not be confirmed due to an absence of other confirmatory evidence i.e scat, hairs, or prints, however they are considered likely to be

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

8.9.1.2.1 Individual Species & Survey Results

Otter

The territories of otters can stretch for several kilometres; the total length of the home range depends on the availability of food. The smallest territories are thought to occur at coastal sites, where territories may be as small as 2km. The longest territories occur in upland streams where an individual may have to range more than 20km to find sufficient food. Territorial marking typically occurs by means of sprainting or anal secretions. These marks are left mostly at features such as bridge footings, boulders, grass tussocks and stream confluences. Within their territories an individual otter may utilise a number of resting sites; these can be hidden refuges above ground (couches), or under-ground chambers (holts). Holts tend to be natural crevices, associated with the roots of trees growing along river and lake banks. These natural recesses provide the otter with a holt that has multiple entrances from which the otter can escape if disturbed. Couches occur frequently in dense vegetation and may be associated with frequently used runs and slides into the water. The rearing of cubs occurs within 'natal holts', which are not marked by spraint. Although capable of breeding at any time of the year, a peak in breeding occurs during the summer and early autumn.

Otters that live in rivers and lakes tend to be completely nocturnal, described as being crepuscular – activity peaks at dusk and dawn. Otters are principally piscivorous (fish eating), relying predominantly on salmonids (salmon and trout), but also eel and small fish species such as stickleback. However, otters are not limited to fish and feed opportunistically on a range of prey when available: frogs are frequently eaten by otters, and the remains of invertebrates (crayfish), birds and small mammals have also been found in spraints.

A survey of suitable watercourses was carried out in January and May 2019. A total of 26 watercourses were surveyed for Otter, 300m upstream and downstream, which include the Newport River (W7), Clare River (W36) and Bilboa River (W53) and 23 other watercourses (W5, W8, W9, W18, W21, W22, W23, W26, W28, W29, W30, W33, W35, W39, W41, W42, W46, W47, W48, W49, W50, W51 and W52). There were four records of Otter at 3 locations within the UWF Grid Connection study area, consisting of slides (locations where Otters tend to slide down steep banks), and spraints (droppings). One of the four records was recorded along the River Bilboa within the Lower River Shannon SAC, and consisted of an Otter slide, recorded approximately 60 metres downstream of watercourse crossing W53. An Otter spraint was recorded along the Tooreenbrien Lower River, approximately 45 metres downstream of watercourse crossing W33, with an Otter print recorded underneath the bridge structure. The fourth record relates to an Otter slide which was recorded along the Annagh (Clare) River, approximately 135 metres upstream of watercourse Crossing W36.

No active breeding or resting sites (Holts or Couches) were identified within 300m of any watercourse crossing.

Previous studies undertaken in January 2017 have recorded Otter evidence within the hinterland of the study area. Otter evidence (Otter path) has previously been recorded on the Munnia stream, east of the Mountphilips Substation compound, this location is >300m from the proposed Mountphilips Substation. An Otter slide was also recorded on the Newport River, approximately 980 metres upstream of the UWF Grid Connection 110kV UGC route. Although occupied territories were not recorded at the downstream locations of these records during the 2019 surveys, considering the territories of Otter can be several kilometres long these records are included (VWT, 2019).

No Otters were observed during current surveys, although this is typical in respect of a species where most activity takes place at night. The location of Otter records within the study area are presented on Figure GC 8.9: UWF Grid Connection Study Area for Non-Volant Mammals (Overview and Maps 1 to 2).

Badger

Badgers are found throughout Ireland in areas of suitable habitat: large swathes of the Irish countryside provide ideal conditions for badgers, with their mosaic of pasture grasslands, hedgerows, and areas of scrub and woodland. Badger densities are lower in upland and mountainous areas, areas of bog, and marginal pasturelands along the Atlantic fringe. Several setts will be present within a badger group's territory but the focus of the badger group is known as the 'main' sett. The main sett is situated roughly central within the group territory and is usually occupied throughout the year and used as the principal breeding sett. Annex setts or outlier setts are smaller and may only be used intermittently or seasonally. An active main sett is characterised by considerable signs of activity, such as copious bedding, nearby latrine (defecation) sites, and well-used paths. Studies in several Irish counties have shown that territory size can vary from as little as 15ha to almost 300ha, with a mean of about 80ha. A review of data available on the National Biodiversity data centre website indicates that Badger setts have been recorded previously within 1km of the proposed development.

Records of six Badger latrines and one print were recorded within the study area (construction works area plus 50m) of the Mountphilips Substation site during surveys undertaken in April 2017, however no confirmed active setts were identified. A Badger print was recorded within the study area along the 110kV UGC works boundary at Knockcurraghbola Commons in 2017 – however no evidence of an active sett was recorded.

Outside of Mountphilips, surveys undertaken in January and May 2019 of the 110kV UGC route found no Badger setts within 50m of the route, nor at the location of the previous 2017 print recorded at Knockcurraghbola Commons. No other evidence in the form of scat, prints and latrines were noted during the survey. No animals were observed, however this is typical in respect of a nocturnal species.

The distribution of recorded Badger evidence is identified on Figure GC 8.9: UWF Grid Connection Study Area for Non-Volant Mammals (Overview and Maps 1 to 2).

Other Mammals:

Fallow Deer are generally found mainly in mature deciduous or mixed woodlands close to open grassland. Red Squirrel is mainly found in coniferous or mixed woodland. Pine Marten generally occur in coniferous or mixed forestry and scrub. Red Fox is found in a wide range of habitats, while Irish Hare is generally found in bog, moor, heath and marsh in addition to mixed farmland, pastoral farmland and more marginal habitats. Hedgehog are associated with edge habitat and pasture, with coniferous woodland, marsh and arable land being least favourable. However, in rural Ireland, hedgehogs select arable land prior to hibernation to build up fat reserves. Irish stoat occur in habitat with suitable cover, in natural areas such as woodland as well as urban areas.

Evidence of Red Fox was noted at two locations at Mountphilips, consisting of a print and scat. Two small mammal burrows were recorded adjacent to watercourses along the 110kV UGC route; these were identified as likely to be Rat burrows, as no Otter slides from the burrow were present. Two locations of Deer tracks/droppings were recorded within the 50m study area of the Mountphilips Substation site during surveys undertaken in April 2017. These are likely to be from Fallow Deer.

Evidence of Deer Species was noted at two locations, one at Mountphilips Substation and another at Upperchurch Substation, both consisting of tracks and droppings.

Evidence of Pine Martin was noted at the Consented UWF Substation.

Evidence of Red Squirrel was noted at Mountphilips Substation site, consisting of evidence of feeding.

While no confirmed evidence of Fallow Deer, Irish Hare, Pine Marten and Red Squirrel was recorded along the 110kV UGC, they are likely to be present throughout the receiving environment due to the presence of suitable habitat within the study area, including grassland, heath and bog, and coniferous and broadleaved woodland.

The location of recorded evidence of Non Volant Mammal records are identified on Figure GC 8.9: UWF Grid Connection Study Area for Non-Volant Mammals (Overview and Maps 1 to 2).

The invasive Greater White-toothed Shrew is known to occur in the wider area and is considered as present within suitable habitat (grassland and woodland). A Greater White-toothed Shrew corpse was found at the Mountphilips Substation location. The invasive American Mink is also considered as present in suitable habitats (slow moving waterbodies such as rivers, lakes, ponds or streams and their adjacent habitat).

Further details on Non-Volant Mammals fieldwork and survey results are included in Appendix 8.8: Bat & Non-Volant Mammals Data.

8.9.1.3 Importance of Non-Volant Mammals

All native mammals are protected by legislation under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000.

Otter, Badger, Pine Marten, Red Squirrel, Irish Hare, Hedgehog and all deer species are afforded protection under the Wildlife Act (as amended). Otter, Pine Marten and Irish hare are also protected under the EU Habitats Directive 92/43/EEC. Otter is further protected under the Convention on Trading in Endangered Species. Otter is also listed as a qualifying interest of the Lower River Shannon SAC and, hence, is evaluated as of International Importance, which is equivalent to a Very High sensitivity rating.

The following mammals are afforded protection under the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats): Otter, Pine Marten, Irish Hare, Badger, Red Squirrel, Hedgehog and Irish Stoat.

Local populations of Irish Hare and Badger are evaluated as of Local Importance (Higher Value), which is equivalent to Low sensitivity, as it is considered unlikely that based on recorded evidence, those populations which occur in close proximity to the proposed development comprise 1% or more of the County population.

Local populations of Pine Marten, Red Squirrel, Hedgehog, and Irish Stoat are evaluated as Local Importance (Higher Value), which is equivalent to Low sensitivity, due to their protection under the Wildlife Act.

Red Fox is not protected under the Wildlife Act and is therefore evaluated as Local Importance (lower Value) and does not require further evaluation. Fallow Deer is listed as a High Impact Invasive Species under the European Communities (Birds and Natural Habitats) Regulations 2011 in Republic of Ireland. Local populations of Fallow Deer are evaluated as Local Importance (lower value), which is equivalent to Negligible sensitivity, due to their non-native status and do not require further evaluation.

The Greater White-toothed Shrew is an Amber-listed invasive species rated as 'medium risk' however their impact on conservation goals remains uncertain due to lack of data (Kelly et al., 2017). As an invasive species no importance evaluation is assigned to this species. As a high impact invasive species American Mink is similarly not assigned an importance evaluation.

8.9.1.4 Sensitivity of Non-Volant Mammals

The conservation status of each of the protected species recorded or assumed to be present in the study area was obtained from the International Union for Conservation of Nature (IUCN) red list, the Habitat Directive Article 17 Reporting, and the NPWS 2009 Red List for Mammals. According to the IUCN Red List: all mammals recorded/assumed to be present are listed as 'Least Concern', with the exception of Otter which is listed as 'Near Threatened'. According to Habitats Directive Article 17 Reporting: Otter, Pine Marten and Irish Hare are all listed as having 'Favourable' conservation status. According to the Irish (NPWS 2009) Red List: Otter and Red Squirrel are classified as 'Near Threatened', while the remaining mammal species are 'Least Concern'.

All mammals are sensitive to the direct effects from disturbance/displacement from breeding and foraging ranges as a result of noise and visual intrusion. Some species show variable or flexible responses such as Otter where research from English Nature (Chanin, 2013) suggests indicate that Otters will rest under roads, in industrial buildings, close to quarries, and at other sites close to high levels of human activity.

Mammals are also sensitive to habitat loss and additive mortality from inadvertent contact with operating machinery or vehicles.

Otter: The National Parks & Wildlife Service's Threat Response Plan for the Otter (NPWS, 2009), a review of and response to the pressures and threats to Otters in Ireland, categorized three principal risks implicated in Otter declines across Europe: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution. Biodiversity Ireland identifies roads, motorways, professional passive fishing, pollution to surface waters, along with the removal of riparian habitats and a decline in eel numbers as the main threats to Otter.

Badger: Setts are sensitive to land take/machinery operations within 30-50m of sett location due to the potential for inadvertent disturbance and/or mortality with distances increasing to 150m if activities such as piling or blasting are proposed (none in this instance). Habitat loss greater than 25% of any social group's territory size is deemed as significant. Disturbance to foraging individuals when foraging from construction noise and visual intrusion especially during periods of night time working. Habitat loss or the construction of significant barriers may also dissect territories. The Department of Agriculture, Food and the Marine has previously conducted vaccination trials of Badgers in certain counties in Ireland and carries out culling in areas where severe cattle TB outbreaks occur. Badgers may also be killed or injured by road traffic as they attempt to access foraging areas- a review of roadkill records on the Biology.ie website[39] found no submitted records of badger mortality on roads which overlap the proposed development.

Pine Marten: Biodiversity Ireland identifies the main threat to Pine marten as forest and plantation management and use, roads and motorways, and predator control/incidental poisoning, along with habitat loss and fragmentation are the most serious threats.

Irish Hare: Biodiversity Ireland identifies the main threat to Irish hare as the modification of cultivation practices and intensive mowing or intensification of farming are identified as high-level threats to Irish hare. Other threats include invasive species, roads and motorways, urbanised areas/human habitation, and hunting, along with habitat loss and fragmentation leading to isolation and inbreeding. Climate change is also identified as a threat, affecting competitive relationships between Irish Hare and Brown Hare species.

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

Available trends on general Irish mammals are limited however the most recent 'red list' (Marnell et al., 2009) has judged most of Ireland's terrestrial mammal species to be of 'least concern'. Otter and Red Squirrel are

[39] Biology.ie, Road Kill Survey, National Biodiversity Data Centre, Ireland, accessed 24 July 2019, <https://maps.biodiversityireland.ie/Dataset/44>

considered near threatened.

Article 17 reporting suggests there appears to have been a genuine improvement in the status of Otter in Ireland with future prospects evaluated as 'favourable' (NPWS, 2019). The Badger population is currently stable in Ireland, estimated in Northern Ireland as 33,500 (Reid et al., 2008) and in the Republic of Ireland as 84,000 (Sleeman et al., 2009). The Pine Marten population is thought to be increasing, and is estimated at 3-10,000 mature individuals (O'Mahony et al., 2007). Future prospects are evaluated as 'favourable' (NPWS, 2019).

Trends in respect of Greater White Toothed Shrew suggest the species is expanding its range by an average of 5.5 km/year (McDevitt et al., 2014). American Mink distribution in Ireland is also expected to continue to increase (Roy et al., 2009).

A scenario in which this proposed project does not take place would result in a continuation of current trends relating to Non-Volant Mammal species within the study area. Populations of mammals would be expected to remain as described above, i.e. favourable in the case of Otter, in line with prospects nationally, stable in the case of Badger etc.

8.9.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to Non-Volant Mammal species, as described herein, will be the receiving environment at the time of construction with ongoing trends as identified expected to be reflected during the operational phase.

8.9.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.9.2.1 Cumulative Evaluation Study Area

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

The study is illustrated on UWF Grid Connection Cumulative Evaluation Study Area for Non-Volant Mammals (Overview and Maps 1 to 2).

8.9.2.1.2 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 8.9.2.2.1 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 8-73 and illustrated on Figure WP 8.9: Whole Project Study Area for Non-Volant Mammals (Overview and Maps 1 to 2) (Volume C3 EIAR Figures).

Table 8-73: Whole Project Cumulative Evaluation Study Area for Non-Volant Mammals

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Otter: Watercourse crossing locations plus 300m in either direction Badger and Other: construction works area, afforestation lands, activity locations plus 50m in all directions	Professional Judgement and as pertinent: Otters: Best Practice guidelines published by the Highways Agency (1999) Badgers: Best Practice guidelines published by the NRA (2005) Other mammal species professional judgement and as per Best Practice (CIEEM, 2016).
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

8.9.2.2 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Non-Volant Mammals also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Non-Volant Mammals with either the UWF 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 Cumulative Evaluations (Section A2.1.4.11).

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

8.9.2.2.1 Potential for Impacts to Non-Volant Mammals

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Non-Volant Mammals. The results of this evaluation are included in Table 8-74.

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

Table 8-74: Results of the Evaluation of the Other Elements of the Whole UWF Project

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

8.9.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.9.2.3.1 Element 2: UWF Related Works

Survey Results

Otter: No Otter evidence was recorded within the UWF Related Works study area.

Badger: No Badger setts were recorded during studies for UWF Related Works.

Other species: Fallow Deer (found mainly in mature deciduous or mixed woodlands close to open grassland), Red Fox (found in a wide range of habitats) and Irish Hare (found in bog, moor, heath and marsh in addition to mixed farmland, pastoral farmland and more marginal habitats) are present. Pine Marten was not recorded during UWF Related Works surveys but is assumed to occur in suitable habitat where it occurs.

The locations of mammal evidence recorded during surveys are identified on Figure WP 8.9: Whole Project Study Area for Non-Volant Mammals (Overview and Maps 1 to 2).

8.9.2.3.2 Element 3: UWF Replacement Forestry

Survey Results

Otter: No Otter evidence was recorded within the UWF Replacement Forestry study area.

Badger: No Badger setts were recorded within the UWF Replacement Forestry study area. A single print was recorded at ITM 594687 661526 within the study area, along a muddy farm track.

Other Species: Fallow Deer and Red Fox were recorded at UWF Replacement Forestry. Pine Marten was not recorded. Irish Hare was not recorded but assumed to be present.

The locations of mammal evidence recorded during surveys are identified on Figure WP 8.9: Whole Project Study Area for Non-Volant Mammals (Overview and Maps 1 to 2).

8.9.2.3.3 Element 4: Upperchurch Windfarm

Survey Results

Otter: As per the 2013 EIS, no Otter was recorded during surveys at the Upperchurch Windfarm site

Badger: As per the 2013 RFI, within the Upperchurch Windfarm a disused single entrance sett has been described approximately 250m southwest of T7 and a single disused entrance badger sett was recorded along a field boundary 150m west of T4. Evidence of Badger foraging was recorded in prior surveys for the 2013 RFI.

Other Species: Evidence of Fallow Deer was recorded previously within the Upperchurch Windfarm (as per the 2013 RFI). Irish Hare does occur and was observed during RFI studies. Red Fox and Pygmy shrew were recorded as present. There were no records of pine marten (*Martes martes*), hedgehog (*Erinaceus europaeus*) and Irish stoat (*Mustela erminea subsp. Hibernica*) during surveying, though the habitats within the windfarm site offer potential habitat for the species.

The locations of mammal evidence recorded during surveys are identified on Figure WP 8.9.

Consideration of the Passage of Time: The makeup of suitable habitat for badger, otter and other mammals on the Upperchurch Windfarm site has not materially changed since 2012/2013, and surveys for UWF Related Works confirmed a low usage of the windfarm area by these species. Therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this 2019 EIAR for UWF Grid Connection.

8.9.2.3.4 Element 5: UWF Other Activities

Haul Route Activity Locations:

No mammal evidence was recorded. This is as expected given that the locations of activities generally occur in immediate proximity to or overlap public roads.

Overhead Line Activity Locations:

Incidental records of mammal signs and individuals were made during surveys (January 2018) within the Overhead Line Activities study area, findings of note are summarised below, and identified on Figure WP 8.9.

An old Otter Holt was recorded within the bank of a drainage ditch in the townland of Killonan. An otter pathway located 80 metres west of Angle Mast AM3 was recorded between the Groody River and an adjoining stream, also in the townland of Killonan.

No active Badger setts were recorded within close proximity to the poles. An old badger sett was recorded within the hedgerow 180 metres north east of Angle Mast AM78, in the Mountphilips townland.

Additional mammals noted included Fox, Fallow Deer, and Rabbit. Mammal pathways were recorded frequently within hedgerows and through treelines. These could be used by a number of mammal species.

8.9.2.3.5 Other Projects or Activities:

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.9.2.1.

8.9.3 PROJECT DESIGN MEASURES for Non-Volant Mammals

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

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

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

The Project Design Measures outlined in Table 8-75 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Non-Volant Mammals**.

Table 8-75: UWF Grid Connection Project Design Measures relevant to Non-Volant Mammals

PD ID	Project Design Environmental Protection Measure (PD)
PD04	All construction works will be carried out during daylight hours.
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).
PD52	Confirmatory surveys for active Otter holts and breeding activity will be carried out 150m upstream and downstream of watercourse crossing locations including those watercourses evaluated as unsuitable for Otter in the current appraisal.
PD53	All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer and outside of 1 hours after sunrise or before sunset during winter.
PD54	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken while breeding females or cubs are present in the holt and NPWS will be notified immediately
PD55	No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand will not take place within 15m of such holts, except under license.
PD56	The prohibited area associated with otter holts, should they be located in confirmatory surveys, will, where appropriate, be protected from any inadvertent disturbance from any works or personnel occurring nearby such as at a bridge and declared as 'Ecology Restriction Zone' with no mention of otters to any onsite staff. Appropriate awareness of the purpose of the excluded area will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each possible access point. All contractors or operators on site will be made fully aware of the procedures pertaining to Ecology Restriction Zones and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
PD67	No badger setts were recorded within 50m of the UWF Grid Connection during pre-planning surveys. Confirmatory surveys will be carried out within 50 m of either side of the construction works area boundary to determine if any new setts have been established in the intervening period following initial pre-planning surveys and the commencement of construction activity. These confirmatory badger surveys will be undertaken no more than 12 months in advance of proposed construction activities, during the period November and April when vegetation cover is reduced. Should a badger

	sett be confirmed, the following measures will be implemented: NWPS will be notified immediately of any new active setts which are located within 50 meters of the footprint of the development; If sett exclusion is required, this will be undertaken by an experienced ecologist under the necessary license and following best practice guidance (NRA, 2005); No construction works will be carried within 50m of an active badger sett during the main breeding season (December 1st to June 30th); and Construction activity in the environs of an active badger sett outside of the breeding period will follow NRA (2005) guidelines, i.e. no heavy machinery will be used within 30m of badger setts (unless carried out under license); lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand will not take place within 10m of sett entrances.

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

8.9.4 EVALUATION OF IMPACTS to Non-Volant Mammals

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

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

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

Table 8-76: 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)*
Otter: Disturbance/Displacement (construction stage)	*Otter – Loss of Habitat, (construction stage)*
Badger: Habitat Loss (construction stage)	*Secondary Mortality of Otter, (construction stage)*
Badger: Disturbance/Displacement (construction stage)	*Otter – Habitat Degradation, (construction stage)*
	Badger - Secondary Mortality, (construction stage)
	Badger – Secondary Mortality, (construction stage)
	Badger – Temporary Loss of Habitat, (construction stage)
	Irish Hare, Pine Marten, Red Squirrel, Hedgehog, Irish stoat, and Fallow Deer - Secondary Mortality, (construction stage)
	Irish Hare, Pine Marten, Red Squirrel, Hedgehog, Irish stoat, and Fallow Deer: Habitat Loss, (construction stage)
	Irish Hare, Pine Marten, Red Squirrel, Hedgehog, Irish Stoat and Fallow Deer: Disturbance/Displacement, (construction stage)
	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew, (construction stage)
	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew, (operational stage)
	General Non-Volant Mammals: Disturbance/Displacement, (operational stage)
	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew, (decommissioning stage)
	General Non-Volant Mammals: Disturbance/Displacement (decommissioning stage)

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 8.9.4.1 to 8.9.4.3.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 8.9.4.4.

8.9.4.1 Impact Evaluation Table: Otter - Disturbance/Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: noise and human disturbance; visual intrusion
Cumulative Impact Source: Noise and Visual Intrusion
Impact Pathway: Air and visibility

Impact Description: Otter are rated as a very high sensitivity receptor (based on International importance ratings) and do not tolerate disturbance at or near holts (breeding dens) that are in active use (breeding may occur at any time of the year, but most likely during the Summer/early Autumn period). When Otters are not breeding, records suggest that Otters are less sensitive to human disturbance (Chanin, 2013). As no active holts were located within 300m (upstream or downstream) of works locations in proximity to suitable Otter habitat (i.e. at watercourse crossing locations) then effects are reduced to disturbance/displacement of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors. This could include the disturbance of animals at resting places (couches). It is also noted that watercourses are present which form part of or are hydrologically connected to European Sites (SAC's) which include Otter as a Qualifying Interest.

These effects are reduced by an adherence to completing works during daylight hours only as part of Project Design.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Otter: Disturbance/Displacement

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
Out of the 68 watercourse crossings along the UWF Grid Connection route, 26 watercourses were identified from surveys of all watercourse crossing locations, as having potential to support Otter and were therefore surveyed 300m upstream and downstream of the crossing for the presence of Otter. Out of these 26 watercourses surveyed, evidence of Otter was found at three watercourse crossings locations or their environs (W33, W36 and W53). No active breeding or resting sites (Holts or Couches) were identified, however.

The evidence of Otter found at three watercourse crossings locations (W33, W36 and W53) relates to a total of four records of Otter within the UWF Grid Connection study area, consisting of slides and spraints. One of the four records was recorded along the River Bilboa within the Lower River Shannon SAC, and consisted of an Otter slide, recorded approximately 60 metres downstream of watercourse crossing W53. Two records were recorded along the Tooreenbrien Lower River, consisting of an Otter spraint approximately 45 metres downstream of watercourse crossing W33 with an Otter print recorded underneath the W33 bridge structure. The fourth Otter record relates to an Otter slide which was recorded along the Annagh (Clare) River, approximately 135 metres upstream of watercourse Crossing W36. No Otters were observed, although this is typical in respect of a species where most activity takes place at night.

110kV UGC works over, and in close proximity to W33, W36 and W53 will involve the excavation of cable trenches and installation of ducting, and reinstatement of the trench. No instream works or culvert replacement works will be required at any of these crossings with the 110kV UGC installed in the road over the existing bridge structures, and although the parapet walls will need to be raised/built higher at W36 and W53, these works are not expected to be longer than 2 weeks in duration with all works to parapet walls taking place from the road surface over the bridges.

Considering the temporary duration of works at watercourse crossings and the scale of the proposed works, along with measures in place during works (Volume D, Tab 10, GC-OCM-17: Raising road level and parapet walls at Rockvale Bridge (W6), Tooreenbrien Bridge (W36) and Anglesey Bridge (W53)) the magnitude of impact in

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relation to disturbance of Otter is expected to be negligible. When the absence of holts within 300m is taken into account, it is considered that disturbance/displacement impacts to breeding Otter are unlikely to occur.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The very high sensitivity rating of the species, and Negligible magnitude of impact;
- Recorded Otter evidence in close proximity to 3 identified crossings, in particular W53 where parapet works will take place over the Lower River Shannon SAC, however;
- No Holts or resting places occur in close proximity, and;
- Works will take place during daylight hours, and from the surface of the bridge only, with;
- In the context of works at larger watercourses will take place in an existing public road road subject to the passage of traffic, to which Otter will be habituated;
- The brief-temporary duration of disturbance events and any corresponding effect, with
- Effects expected to be reversible, and;
- Project design measures to avoid/reduce effects also in place, including at all watercourse crossing locations.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: There is potential for cumulative effect where the UWF Grid Connection comes in close proximity to the UWF Related Works and Upperchurch Windfarm construction works areas. Six of the seven watercourse crossings (W62-W68) within the zone of overlap with UWF Related Works and Upperchurch Windfarm and which are associated with the UWF Grid Connection are Class 4 drains which have marginal habitat value to Otter, with limited prey availability (no fisheries potential). No evidence of Otter at the remaining watercourse crossing (W65-Class 2 indicating high fisheries potential) was recorded in studies to date. This crossing is also outside the Lower River Shannon SAC (designated for Otter) catchment. Therefore, the magnitude of cumulative impacts in relation to disturbance of Otter is expected to be negligible. When the absence of holts within 300m is taken into account, it is considered that disturbance/displacement impacts to breeding Otter are unlikely to occur.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- 6 of the 7 watercourses within the zone of cumulative impacts are drains, with the remaining 1 water-course with potential to provide habitat, but no evidence of Otter recorded;
- Works will take place during daylight hours only, and;
- Be of brief-temporary duration, with;
- Unlikely to occur with the application of project design measures for the protection of Otter.

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

Element 2: UWF Related Works

Impact Magnitude: 32 No. watercourse crossings in total are required for UWF Related Works with instream works required at 25 No. of these crossings. Due to 75% of these watercourses being drains or marginal watercourses, and the absence of otter holts within 300m of the crossing points, impact magnitude is expected to be Negligible

Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:

- Application of project design measures for the protection of Otter,
- No active holts were identified overlapping the construction area boundaries or within 300m, and;
- Works will take place during daylight hours only, and;

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- Be of brief-temporary duration.

Element 3: UWF Replacement Forestry

Impact Magnitude: No active holts or resting places were recorded in baseline studies and all planting will be done by hand. Therefore impact magnitude is expected to be Negligible.

Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:

- No active holts or resting places were recorded in baseline studies, and;
- All planting will be done by hand, and;
- Undertaken during daylight hours, and
- Of temporary duration;
- Any effect will be reversible, given the low magnitude of source disturbance.

Element 4: Upperchurch Windfarm

Impact Magnitude: No Otter were recorded during windfarm surveys; therefore the impact magnitude of any disturbance is expected to be Negligible.

Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:

- No active holts or resting places were recorded in baseline studies for the windfarm;
- watercourses in the windfarm area generally comprise drains which have marginal habitat value to otter and;
- works will be of temporary duration.

Element 5: UWF Other Activities

Impact Magnitude: No otter holts or resting places were recorded at Haul Route Activity locations, and the locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours. Therefore, the impact magnitude is expected to be Negligible

Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:

- No otter holts or resting places were recorded at Haul Route Activity locations, and;
- Locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours;
- The offsetting effects of long-term management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing Otter habitat – including the enhancement of riparian corridors.
- The low reversibility of the above described management.

Evaluation of Other Cumulative Impacts – Otter: Disturbance/Displacement

Whole UWF Project Effect

Magnitude:
Construction works involving the use of machinery and excavation work at watercourse crossing points (both existing and new crossing points) will occur across a c.23km wide area within the River Shannon and River Suir catchments. There is potential to cause disturbance or displacement of otter at larger watercourse crossing points. These larger watercourses occur along the UWF Grid Connection, whereas the watercourses on the UWF Related Works and Upperchurch Windfarm sites are mainly drains and larger drains/watercourses with marginal habitat value to otter. Sequential effects could occur where Otters foraging or transiting along watercourses

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experience multiple sources of instruction/disturbance in quick succession such as encountering multiple work crews undertaking construction activities.

In relation to in-combination effects of the whole project, there is no potential for cumulative additive effects to Otters from both the UWF Related Works and the Upperchurch Windfarm due to the absence of Otter recorded at the watercourses within these sites. There is no potential for cumulative effects of the UWF Replacement Forestry with the Other Elements due to the Neutral effect of UWF Replacement Forestry. The magnitude of the in-combination effect of the whole project, where considered in its entirety is in the order of UWF Grid Connection – i.e. Negligible. In total 3 no. watercrossing points (W33, W36 and W53) along the public road had signs of Otter use within 300m, the nearest of these crossing points (W53) is separated from UWF Related Works by ca.3km (to the nearest outlying works location (UWF Related Works HW7)- with most locations ca.4km or more) and Upperchurch Windfarm by ca.4km, therefore there is no likelihood of additive cumulative effects to individual Otters from both the UWF Grid Connection works and UWF Related Works or Upperchurch Windfarm works.

Significance of the Whole Project Effect: Slight

Rationale for Impact Evaluation:

- Notwithstanding the separation distances between the 3-no. watercourse crossing locations along the UWF Grid Connection and the watercourse crossing locations associated with the UWF Related Works and Other Elements;
- The absence of Otter records at the UWF Related Works, UWF Replacement Forestry and Upperchurch Wind-farm study areas;
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;
- in the context of crossing locations as part of UWF Grid Connection comprising trenching works or road/par-apet raising works within existing bridges where the works overlap the Lower River Shannon SAC, which has Otter as a Qualifying Interest, with;
- Recorded evidence of Otter in close proximity, and
- Potential (albeit unlikely) for sequential effects

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

8.9.4.2 Impact Evaluation Table: Badger - Habitat Loss

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: construction of new access roads and compounds.

Cumulative Impact Source: Excavations, construction of new access roads, compounds and hardstanding areas, afforestation

Impact Pathway: Land cover

Impact Description: Badger is evaluated as a Low Sensitivity receptor. Construction works can cause a permanent and temporary loss of some suitable foraging or breeding habitat in the form of grassland, woodland and/or hedgerows under the footprint of permanent structures such as access roads, compounds, and hardstanding areas, in addition temporary loss could occur as a result of groundworks and temporary access roads. Permanent structures may also dissect territories.

Loss of suitable foraging habitat, may affect body condition, survival rate and/or breeding capacity dependant on the percentage of loss within a groups territory (>25% is considered as significant) and the availability of other food resources. Badger studies indicate that the average territory size is ca. 80Ha (NRA, 2005).

Permanent land-use change of non-linear habitat features at the Mountphilips site will comprise 1.75Ha in total, the vast majority of which (1.7ha) is improved agricultural grassland (GA1), with the remaining 0.05ha comprising wet grassland (GS4). Temporary land-use change during construction will comprise 0.2ha of improved agricultural grassland (GA1). With respect to linear features such as treelines and hedgerow, it will be necessary to remove 160m of treeline at the substation site entrance to widen the entrance and provide sightlines. These will be reinstated by planting the equivalent amount of hedgerow and trees behind the new sightlines. It will be necessary to remove 40m of hedgerow to build the new access road. A new hedgerow, c.700m in length, will be planted on the berms on either side of the new permanent access road between the Site Entrance and Mountphilips Substation and around the substation compound; the sides of the berms will be seeded with native grass and wildflower species, for the benefit of biodiversity in the area. All new hedging will be locally sourced native hedgerow species, and the replacement trees will be native hedgerow species and at least 10 years old.

Badgers will benefit positively from varying degrees of hedgerow enhancement, the creation of new hedgerows and also the management of lands as part of the Upperchurch Hen Harrier Scheme (UWF Other Activities).

Impact Quality: Negative, Neutral

Evaluation of the Subject Development Impact – Badger: Habitat Loss

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

The potential for effects is limited to the Mountphilips Substation site as no land cover change is proposed along the 110kV UGC route outside of the Mountphilips Substation site.

No setts were recorded within 50m of the Mountphilips Substation site. Evidence of badger only relates to four Badger latrines and one print were recorded within the 50m buffer of the Mountphilips Substation site works boundary during surveys undertaken in April 2017. No active badger setts or other signs of Badger activity in the form of scat, prints and latrines were recorded during the baseline surveys in 2017 or 2019.
While no evidence of Badger activity was recorded, suitable foraging habitats, consisting of grassland, woodland and hedgerows were recorded within 50m of Mountphilips Substation site, and along the 110kV UGC (although no habitat loss associated with 110kV UGC), considering the widespread distribution of Badger in Ireland, and the presence of suitable foraging habitat within and in close proximity to the UWF Grid Connection study area, Badger are considered likely to forage in the area surveyed

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Seeing as the installation of the 110kV UGC will be confined to paved roads, and as hedgerows and/or treelines at the Mountphilips Substation site will be reinstated, the impact magnitude on Badger resulting from the loss of habitat is expected to be limited only to the Mountphilips Substation where land cover change will relate to the new permanent road, roadside berms and the Mountphilips Substation compound, comprising 1.75Ha in total, and considered to be low. Potential territory dissection is similarly limited to the Mountphilips Substation site, as all works outside of the Mountphilips Substation site will only take place in existing paved surfaces. At the Mountphilips Substation site, the new permanent access road could cause territory dissection, however the provision of gates on opposite sites of the new permanent access road in each of the three fields between the site entrance and the substation compound will limit any dissection effect to low magnitude.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Low sensitivity and the low magnitude of foraging habitat landcover change;
- No setts were recorded within the study area for UWF Grid Connection.
- While badgers' cross roads to access feeding areas, they generally do not forage along roads, and are particularly unlikely to forage along a road as busy as the R503.
- the brief duration of the works and the absence of significant habitat loss associated with the UWF Grid Connection
- The extent of land cover change, within the context (less than 2%) of an average territory size of 80Ha, and;
- Very slight contrast with baseline conditions is expected, notwithstanding
- The permanent duration of land cover change at the Mountphilips Substation site, and;
- Low reversibility

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: No cumulative habitat loss or habitat enhancement impacts are likely to occur due to the separation distance (c.22km) between the habitat loss/habitat enhancement for Mountphilips Substation and the habitat loss/habitat enhancement which is expected to occur at the sites of the Other Elements of the Whole UWF Project.

Significance of the Impact: No cumulative impact

Rationale for Impact Evaluation:

- C.22km separation distance between habitats affected by the UWF Grid Connection and the habitats affected by the Other Elements of the Whole UWF Project.

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

Element 2: UWF Related Works

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

Temporary loss of foraging habitat from works such as internal windfarm cabling (4.6km in agricultural lands and 2.1km in forestry), Haul Route Works (widening of roadside verges for 1710m in total; temporary removal and reinstatement of 1035m of hedgerow and earthen banks which form roadside boundaries; permanent removal of 25m of roadside boundary and the construction of 290m temporary access roads on private lands), temporary Site Entrances (n=14), Temporary Access roads (up to 5.3km) and the storage of temporarily excavated material is also likely to occur during the construction stage and until vegetation has been re-established on reinstated lands.

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

surrounding farmed area is permanent grassland, with livestock farming, dairying and beef cattle rearing ongoing.

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

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

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

Element 3: UWF Replacement Forestry

Impact Magnitude:
4Ha of suitable foraging habitat for Badger in the form of improved agricultural grassland and wet grassland will undergo a permanent land cover change to a mixed species, native woodland, which will comprise tall trees and understory shrubs, along with wide ride lines, and a mix of tall grasses and scrub land cover maintained during the growth stage. The existing riparian habitat will be enhanced through the planting of Hazel, alder and willow species, and protected through the placement of fencing. The area to be created represents 5% of an average territory size (80Ha). The UWF Replacement Forestry will result in a permanent land cover change, to habitat also suitable for Badger resulting in a slight positive change to higher quality breeding and foraging habitat.

Significance of the Impact: Slight (Positive)

Rationale for Impact Evaluation:

- No setts were identified within the study area for UWF Replacement Forestry, but prints indicating a foraging range were noted, and;
- The extent of habitat change which is;
- A positive contrast with baseline conditions;
- With permanent duration, and;
- Low reversibility.

Element 4: Upperchurch Windfarm

Impact Magnitude:
As per the 2013 EIS: The total habitat loss for Upperchurch Windfarm is 9.65Ha, of which conifer plantations (WD4) is 1.18Ha. The remaining 8.47Ha area is suitable foraging habitat for Badger in the form of Improved agricultural grassland GA1, Wet Grassland GS4, Mosaic of Improved Grassland & Wet Grassland GA1/GS4, Mosaic Wet Heath & Upland Blanket Bog HH3/PB3, Acid Grassland GS3 and Mosaic Acid Grassland & Upland Blanket Bog GS3/PB3. The scale of land cover change is 1.6% of available habitat within the study area boundary of 536Ha.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- As per ABP Inspector's Report "Arising from my assessment above and based on the information available therefore I Conclude that the development will not give rise to Significant adverse effects on the environment and that ongoing impacts are limited in terms of scale and significance and can be remediated."

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Element 5: UWF Other Activities
Impact Magnitude: No permanent land take of Badger foraging or breeding habitat.
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • Badgers are not likely to forage extensively or rely on roadside habitats, and; • No permanent land cover change will occur, and; • The brief duration of any temporary effects, with; • Very slight contrast with baseline conditions expected, and; • The reversibility of temporary habitat loss with reinstatement of roadside verges following delivery and; • Positive effects will accrue from land management as part of the Upperchurch Hen Harrier Scheme, and; • Overhead Line Activities will not require land take of suitable Badger habitat nor contrast with the existing environment.
Evaluation of Other Cumulative Impacts – Badger: Habitat Loss
Whole UWF Project Effect
Magnitude: Instances of foraging and or breeding habitat loss will occur across the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm; total habitat loss across the Whole UWF Project areas will be c.10.72ha. The extent of habitat loss, within the context of an average territory size is less than 2% for all Elements of the Whole UWF Project. All habitat loss associated with UWF Grid Connection is confined to the Mountphilips Substation site which is too far removed, c.23km, to additively combine with the rest of the Whole UWF Project. The UWF Replacement Forestry will result in a permanent land cover change, to habitat also suitable for Badger resulting in a slight positive change to higher quality breeding and foraging habitat. Management activities as part of the Upperchurch Hen Harrier scheme, whilst targeted at Hen Harrier will also benefit and possibly attract Badgers to the area.
Significance of the Whole Project Effect: Not Significant
Rationale for Impact Evaluation: • The extent of total land cover change, and; • Instances of foraging and breeding habitat loss will occur across the UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm. However, due to a negligible loss of habitat associated with the UWF Grid Connection, this element is not expected to have any noticeable cumulative impact with the other project elements due to separation distance. • The absence of badger setts, and therefore the absence of identified territories; • very slight contrast with baseline conditions is expected, and; • The long-term duration of permanent land cover change, with; • Low reversibility, is; • Offset by management activities as described

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

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8.9.4.3 Impact Evaluation Table: Badger - Disturbance/Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction Noise and Visual Intrusion
Cumulative Impact Source: Noise and Visual Intrusion
Impact Pathway: Air and visibility

Impact Description: Badgers are low sensitivity receptors. Disturbance to or Displacement of Badgers may occur where construction works are in close proximity to occupied Badger Setts. Serious disturbance may cause an avoidance response and result in the mortality of cubs, which are typically underground during the months of January through to February prior to emergence in April. Outside of proximity to setts, disturbance may occur to foraging animals should works occur during nocturnal periods. Sequential effects could occur should foraging animals experience multiple source of noise/visual intrusion whilst e.g. foraging.

Works will be undertaken during daylight hours only as part of Project Design, which substantially reduces the potential for disturbance effects. No construction works will take place within 50m of an active badger sett in the main breeding season (December to June inclusive), as part of Project Design, should one be located during confirmatory surveys.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Badger: Disturbance/Displacement

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:
No active badger setts or other signs of Badger activity were recorded during the baseline survey of the UWF Grid Connection in 2019 and therefore the only evidence is that previously recorded within 50m of the Mountphilips Substation site (comprising four Badger latrines and one print) and a single paw print at Knockcurraghbola Commons.

Groundworks only relate to the Mountphilips Substation site, with works for the 110kV UGC, outside of the Mountphilips Substation site, located entirely along paved road surfaces. Therefore, effects are limited to the Mountphilips Substation site, and construction activities therein, as roadside habitat along the 110kV UGC (between the Mountphilips Substation site and the consented UWF Substation) is not expected to be used extensively or relied upon as foraging habitat by badger The construction of the 110kV UGC will consist of brief effects confined to the existing public road, during daylight hours, and the magnitude of impact to badgers are therefore expected to be Negligible.

At the Mountphilips Substation site, suitable habitat, consisting of grassland and hedgerow, occurs with badger evidence previously recorded. Construction works will involve the widening of the existing entrance from the public road, the removal of hedgerow, the construction of a new permanent access road and substation compound, along with temporary works at the new End Mast locations, complete with boundary fencing. Construction works will be carried out during daylight hours (as per Project Design), therefore any disturbance/displacement effects are evaluated as Negligible as Badger as nocturnal.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The low sensitivity and the Negligible Magnitude
- The absence of badger setts within 50m of the UWF Grid Connection;
- Temporary duration of the works;
- Completion of works during daylight hours;

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- The majority of the works will be confined to the existing public road, with all works for the 110kV UGC carried out from paved surfaces only, and;
- Effects are unlikely to cause noticeable changes in the character of the environment.

Element 2: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: No cumulative disturbance/displacement impacts are likely to occur due to the separation distance (c.22km) between any disturbance/displacement which may occur from works at Mountphilips Substation and any disturbance/displacement which may occur from works at the sites of the Other Elements of the Whole UWF Project. Potential for sequential effects during construction of the 110kV UGC will be avoided due to works taking place during daylight hours only and the limited evidence of Badger outside of Mountphilips.

Significance of the Impact: No Cumulative Impact

Rationale for Impact Evaluation:

- C.22km separation distance between the sources of impact associated with the UWF Grid Connection and associated with the Other Elements of the Whole UWF Project.

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

Element 2: UWF Related Works

Impact Magnitude: No active Badger setts were identified in baseline studies of UWF Related Works, therefore it is considered unlikely that badgers will be disturbed by noise and visual intrusion during construction works.

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- No active Badger setts were identified in baseline studies of UWF Related Works.

Element 3: UWF Replacement Forestry

Impact Magnitude: No impact

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- No setts were identified within the study area, and
- All planting will be done by hand, undertaken during daylight hours, and;
- Of temporary duration;
- No contrast to baseline conditions is expected.

Element 4: Upperchurch Windfarm

Impact Magnitude:
'Some noise and anthropogenic disturbance during the construction phase of the development'.

Significance of the Impact: Not significant

Rationale for Impact Evaluation:

- No active setts were identified;
- Duration temporary.
- Impact from disturbance is expected to be mostly reversible post construction.
- As per the UWF EIS 2013 - it is probable that a negative impact to badger will not be significant.

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Element 5: UWF Other Activities
Impact Magnitude: Impact magnitude is negligible as there will be no sources of disturbance/intrusion of sufficient magnitude to affect foraging Badger. No setts were located in close proximity to locations of activities.
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No Badger setts were identified at Haul Route activity locations or within 50m of same. • Overhead Line Activities at any one location will be brief-momentary in duration, conducted during daylight hours only, with no excavations and the use only of light vehicles. • Activities pertaining to the Upperchurch Hen Harrier Scheme management prescriptions will be similar to existing agricultural activities.
Evaluation of Other Cumulative Impacts – Badger: Disturbance/Displacement
Whole UWF Project Effect
Magnitude: Construction works will occur across a c.23km wide area, which includes suitable foraging and breeding habitat for badger. However no active badger setts were identified within the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry or Upperchurch Windfarm study areas. UWF Related Works, UWF Replacement Forestry and UWF Other Activities are expected to have Neutral Effects, while the effects of the consented Upperchurch Windfarm and the proposed UWF Grid Connection will not be significant. UWF Grid Connection, UWF Related Works and Upperchurch Windfarm will be undertaken during daylight hours only as part of Project Design, which substantially reduces the potential for disturbance effects.
Significance of the Whole Project Effect: Not Significant
Rationale for Cumulative Impact Evaluation: • The absence of active badger setts and badger records in the study areas; • Project design measures to avoid/reduce effects on Badger, with • Works completed during daylight hours only.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

8.9.4.4 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-77 below.

Table 8-77: Description and Rationale for Excluded Impacts to Non-Volant Mammals

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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage /Planting Stage				
Land take	1,2, 4,	Land cover	Otter: Loss of habitat	Evaluated as Excluded: There will be no permanent loss of aquatic habitat. Any loss of riparian habitat will be negligible (Elements 1, 2, 4), resulting in no contrast to baseline conditions and Neutral effects on Otter. No loss of aquatic habitat in relation to Elements 3, 5.
Operating Machinery, Construction Traffic	1,2,3,4,5	Direct Contact	Otter: Secondary Mortality	Evaluated as Excluded: Neutral effects. No holts or resting places are located within the works areas associated with Elements 1,2,3,4). Sources of mortality are therefore restricted to accidental collision with vehicles on roads, which is avoided through works only occurring in daylight hours.
Operating Machinery, construction/ trenching works near and at watercourses	1,2,3,4,5	Water pollution	Otter; Habitat degradation	Evaluated as Excluded: Due to the protection of water quality through project design measures, sources of significant habitat degradation and effects on secondary prey species are avoided.
Land take	1,2,3,4,5	Land cover	Badger: Temporary loss of habitat	Evaluated as Excluded: Some temporary loss will occur during construction works for UWF Grid Connection at Mountphilips Substation site, and for UWF Related Works and Upperchurch Windfarm; and as reinstatement will occur immediately following the completion of construction works in an area – effects will be Neutral
Operating Machinery	1,2,3,4,5	Direct Contact	Badger: Secondary Mortality	Evaluated as Excluded: Neutral effects, No setts are located within the construction works areas for UWF Grid Connection, UWF Related Works or Upperchurch Windfarm. Sources of mortality are therefore restricted to accidental collision with vehicles on roads, with effects avoided through an adherence to only working during daylight hours. Any increases in traffic are not considered likely to result in increased traffic led mortality, given existing habituation, low levels of mortality recorded on roads within the area.
Operating Machinery	1,2,3, 4,5	Direct Contact	Irish Hare, Pine Marten, Red Squirrel, Hedgehog, Irish	Evaluated as Excluded: Works will only be conducted during daylight hours. Potential Secondary mortality is limited to vehicular collision

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
			Stout and Fallow Deer - Secondary Mortality	on roads, and as such effects are considered unlikely.
Land Take	1,2,3,4,5	Land Cover	Irish Hare, Pine Marten, Red Squirrel, Hedgehog, Irish Stout and Fallow Deer - Habitat Loss	Evaluated as Excluded: Neutral Impacts In relation to UWF Grid Connection, permanent habitat loss is limited to that at Mountphilips Substation site and is considered negligible in the context of available habitat for these species overall. The loss of foraging habitat associated with UWF Replacement Forestry is offset by the provision of further breeding and foraging habitat through planting of deciduous woodland, and the enhancement measures proposed as part of the Upperchurch Hen Harrier Scheme (UWF Other Activities). Land take associated with UWF Related Works (Permanent land cover change of 0.28Ha (<1%) of available suitable foraging or breeding Pine Marten, Red Squirrel and Fallow Deer habitat (48Ha)) is negligible in the context of existing habitats. With respect to Upperchurch Windfarm no Pine Marten were recorded in studies to inform the EIS and the scale of habitat loss in respect of other species considered here is evaluated as negligible. No significant contrast to baseline conditions with positive gains is expected.
Noise and Visual Intrusion	1,2,3,4,5	Air and Visibility	Irish Hare, Pine Marten, Red Squirrel, Hedgehog, Irish Stout and Fallow Deer - Disturbance /Displacement	Evaluated as Excluded: Neutral Impacts Instances of disturbance may occur across all elements, cumulative impacts may occur where various Elements are located in close proximity to each other. However, the scale/magnitude of any disturbance response is evaluated as negligible. The spatial extent of any disturbance/displacement will be limited to the immediate vicinity of the construction area boundaries. Sequential effects are unlikely given the alternative habitat available. Habituation by these species to the existing use of the roads along the route of the UWF Grid Connection 110kV UGC precludes the potential for significant disturbance effects.
Delivery of Materials	1,2,3,4,5	Landscaping	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew	Evaluated as Excluded: The Irish population of this invasive species is considered as Established/ Widespread and expanding. Range estimated at 7,600km2 in 2013, with a rate of expansion of 0.5-14.1km/yr depending on landscape characteristics (McDevitt *et al.*, 2014[40]). It is considered that the low number of deliveries of organic materials such

[40] McDevitt, A.D., Montgomery, W.I., Tosh, D.G., Lusby, J., Reid, N., White, T.A., McDevitt, C.D., O'Halloran, J., Searle, J.B. and Yearsley, J.M., (2014). Invading and expanding: range dynamics and ecological consequences of the greater white-toothed shrew (Crocidura russula) invasion in Ireland. PLoS One. 2014 Jun 23; 9(6):e100403. doi: 10.1371/journal.pone.0100403. eCollection 2014

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				as hedging (a likely source of transportation or introduction) will have Neutral additive effects, within the context of background trends (a species already established and increasing rapidly).
Operational Stage / Growth Stage				
Delivery of Materials	1,2,3,4,5	Landscaping	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew	Evaluated as Excluded: No significant deliveries of organic materials are required for any Element of the Whole UWF Project.
Noise and human activity Operating Machinery	1,2,3,4,5	Air and Visibility	General Non-Volant Mammals: Disturbance/Displacement	Evaluated as Excluded: Levels of operational maintenance will have Neutral disturbance effects to mammals.
Decommissioning Stage				
Delivery of Materials	1,2,3,4,5	Landscaping	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew	Evaluated as Excluded: In relation to Element 1, 3, no potential for effects as no decommissioning will take place. In relation to Element 2,4,5 – no significant deliveries of organic materials are required. Nonetheless, the spread of invasive species will be avoided through the implmenetation of Best Practice biosecurity measures as per the Invasive Species Management Plan (Volume D)
Noise and Human Activity	1,2,3,4,5	Air and Visibility	General Non-Volant Mammals: Disturbance/Displacement	Evaluated as Excluded: In relation to Element 1, 3, no potential for effects as no decommissioning will take place. In relation to Element 2,4,5 – Daylight hours of works, habituation, and limited frequency of disturbance reduces disturbance/displacement to 'Neutral'

8.9.5 Mitigation Measures for Impacts to Non-Volant Mammals

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

8.9.6 Evaluation of Residual Impacts to Non-Volant Mammals

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impacts are the same as the Impacts set out in Impact Evaluation Table sections for Non-Volant Mammals above (Section 8.9.4) – i.e. **no significant adverse impacts**.

8.9.7 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 a Invasive Species Specialist.

8.9.7.1 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.

8.9.7.2 Invasive Species Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Invasive Species Management Plan developed to prevent/avoid the introduction and/or spread of invasive species. The Invasive Species Management Plan includes Best Practice biosecurity measures and describes supervision by an Invasive Species Specialist during the construction phase.

8.9.8 Summary of Impacts to Non-Volant Mammals

A summary of the Impact to Non-Volant Mammals is presented in Table 8-78.

Table 8-78: Summary of the impacts to Non-Volant Mammals

Impact to Non-Volant Mammals:	**Otter: Disturbance /Displacement**	**Badger: Habitat Loss**	**Badger: Disturbance /Displacement**
Evaluation Impact Table	*Section 8.9.4.1*	*Section 8.9.4.2*	*Section 8.9.4.3*
Project Life-Cycle Stage	Construction	Construction	Construction
UWF Grid Connection *Direct/indirect impact*	**Slight**	**Not Significant**	**Imperceptible**
UWF Grid Connection *Cumulative impacts*	**Imperceptible**	**No Cumulative**	**No Cumulative**
Element 2: UWF Related Works	Neutral	Not Significant	Neutral
Element 3: UWF Replacement Forestry	Neutral	**Slight (positive)**	Neutral
Element 4: Upperchurch Windfarm	Neutral	Not Significant	Not Significant
Element 5: UWF Other Activities	Neutral	Neutral	Neutral effect
All Elements of the Whole UWF Project	Slight	Not Significant	Not Significant

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

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

8.10 Sensitive Aspect No.9: Amphibians & Reptiles

This Section provides a description and evaluation of the Sensitive Aspect - Amphibians & Reptiles.

Donncha O Cathain, Jennifer Pearson, Chris Cullen and Howard Williams were the main authors of this Section. Please see Sources of Informaiton (Section 8.1.7) and Methodology (Section 8.1.8) for details of the desktop and fieldwork surveys which have informed the evaluation of Aquatic Habitats & Species.

8.10.1 BASELINE CHARACTERISTICS of Amphibians & Reptiles

8.10.1.1 STUDY AREA for Amphibians & Reptiles

The study area for Amphibians & Reptiles in relation to the UWF Grid Connection is described in Table 8-79 and illustrated on Figure GC 8.10: UWF Grid Connection Study Area for Amphibians & Reptiles (Volume C3 EIAR Figures).

Table 8-79: UWF Grid Connection Study Area for Amphibians & Reptiles

Study Area for Amphibians & Reptiles	Justification for the Study Area Extents
Construction works area plus 50m in all directions	Professional Judgement and as per Best Practice (CIEEM, 2016).

8.10.1.2 Baseline Context and Character of Amphibians & Reptiles in the UWF Grid Connection Study Area

Taking into account the species distribution of amphibians and reptiles in Ireland, suitable habitat exists within the study area for Smooth Newt, Common Frog, and Common Lizard.

Smooth Newt (*Lissotriton vulgaris*) is the only species of tailed amphibian found in Ireland. While commonly encountered near water bodies, adult newts are actually terrestrial, only returning to water bodies to breed. They tend to prefer habitats that offer protection from desiccation, such as long grass, woodland and scrubland. Newts will over-winter in refugia such as woodpiles and rotting logs, which offer them some protection from the elements (HSI). Smooth Newt has been recorded from Co. Tipperary in suitable habitat (Meehan 2013). In general, it is perceived that information gaps exist in terms of the distribution of these species in North Tipperary (Browne 2007).

Common frog *(Rana temporia)* is one of only three amphibians found in Ireland. It is a widespread and abundant species occurring in a broad range of habitats throughout the country. Adults congregate to spawn in ponds and ditches in the spring. Eggs develop into tadpoles as water temperature rises and following metamorphosis young froglets emerge onto land in early summer. These young animals are particularly vulnerable to predation. They spend 2-3 years on land, feeding on terrestrial invertebrates, before returning to freshwater to breed. A life expectancy of 3-4 years would be typical. Extrapolated data primarily from the 2011 National Frog Survey (Reid *et al.,* 2013), used to inform Ireland's Article 17 under the EU Habitats Directive indicates the distribution of this species within three 10km squares overlapping with the UWF Grid Connection. These records consisted of two observations of Common Frog with the 10km grid square R75 and two observations of Common Frog with R85 and one observation of Common Frog in R86. According to Biodiversity Ireland's public records, there are three recent records (2019) of Common Frog; two records are located north of the R503 west of Lackamore and one record is located north of the R503 within the Mauherslieve region. The closest record occurs 245 metres north of the R503.

Common or Viviparous Lizard (*Zootoca vivpera*) is Ireland's only native terrestrial reptile. The species is widely distributed on the Irish mainland and at least some of the islands. It often frequents damp habitats, as the humidity has a beneficial effect on growth rate and activity. Ideal habitats for the species are south-facing, damp tussocky grassland, scrub covered hillsides, dunes or banks, woodland tracks and it also resides in peat bogs, dry grasslands and heathlands (HSI).

Survey Results:

Smooth Newt: Due to their wide distribution across Ireland, there is the possibility that Smooth Newt occurs within suitable habitat, typically found in slow-moving water such as natural ponds, ditches and wetlands. Man-made habitats such as garden ponds and quarry ponds are not significant components of the newt's habitat (Meehan 2013). No Smooth Newts were recorded during surveys undertaken in January 2019. However, this was outside the optimum survey period for this species thus suitable habitat for this species was noted. Foraging Smooth Newt can exploit a wide range of habitats but show a preference for wet grassland, woodland and scrub; thus, where these habitats occur along the 110kV UGC route, there is suitable foraging habitat for this species. Breeding Smooth Newt show preference for fish free ponds and ditches with abundant emergent vegetation.

No Smooth Newts were recorded during surveys undertaken in May 2019 along the section of route bypassing Newport town, suitable habitat for this species was noted.

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

Common or Viviparous Lizard: Due to their wide distribution across Ireland, there is the possibility that Viviparous Lizard occur within suitable habitat (woodland, marshes, heath, moors, bogs, acid grassland). No Viviparous Lizards were recorded during surveys undertaken in January 2019. However, this was outside the optimum survey period for this species thus suitable habitat for this species was noted. Suitable habitat is present along the route provided by woodlands and bogs, and lizards are expected to occur. No Viviparous Lizards were recorded during surveys undertaken in May 2019 along the section of route bypassing Newport town, suitable habitat for this species was noted.

Further details on Amphibians, Reptiles & Marsh Fritillary fieldwork and survey results are included in Appendix 8.9: Amphibians, Reptiles & Marsh Fritillary Field Work & Survey Results.

8.10.1.3 Importance of Amphibians & Reptiles

All amphibian and reptile species are protected under the Wildlife Act (1976, amended 2000).

The Common Frog is also listed on the Annex V of the Habitats Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC), meaning that the removal of this species from the wild is restricted by European law.

All amphibians and reptiles present are evaluated as of Local Importance (Higher Value).

8.10.1.4 Sensitivity of Amphibians & Reptiles

Amphibians and reptiles are sensitive to direct mortality, including at the larval stage (frogs and newts), habitat loss, habitat fragmentation and disturbance through visual intrusion, noise and vibration. Amphibian declines have also been linked to the emergence of previously unrecorded diseases.

Populations of amphibians and reptiles are evaluated as **Low Sensitivity** receptors.

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

The Common Frog was assessed as having a 'Favourable' conservation status within the National Frog survey of Ireland 2010/11 (Reid *et al.,* 2013). Its conservation status is classified as least concern in a European context (Kuzmin *et al.,* 2009). No estimate of population trend is available as the 2010/11 survey provided the first baseline for the country.

The Smooth Newt has a conservation status of least concern in a European context (Arntzen *et al.,* 2009). There is no population estimate available for Ireland and therefore, there is no evidence to illustrate the current population status.

The Viviparous Lizard has a conservation status of least concern in a European context, (Agasyen *et al.,* 2010). There is no population estimate to-date for Viviparous Lizards in Ireland and hence, there is no evidence to illustrate the current population status.

8.10.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to amphibians and reptiles, as identified above, will be the receiving environment at the time of construction and on into the operational phase.

8.10.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.10.2.1 Overview of Other Elements, Other Projects or Activities

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

The study area is illustrated on Figure CE 8.10: UWF Grid Connection Cumulative Evaluation Study Area for Amphibians & Reptiles.

8.10.2.1.2 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 8.10.2.2.1 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 8-80 and illustrated on Figure WP 8.10: Whole Project Study Area for Amphibians & Reptiles (Volume C3 EIAR Figures).

Table 8-80: Whole Project Cumulative Evaluation Study Area for Amphibians & Reptiles

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

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

The evaluation of cumulative impacts to amphibians & reptiles also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to amphibians & reptiles with either the UWF 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 Cumulative Evaluations (Section A2.1.4.12).

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

8.10.2.2.1 Potential for Impacts to Amphibians & Reptiles

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect amphibians & reptiles. The results of this evaluation are included in Table 8-81.

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

Table 8-81: Results of the Evaluation of the Other Elements of the Whole UWF Project

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 (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No likely effects due to: The nature and small scale of the proposed works, with no compaction or habitat degradation likely to occur, and no permanent land-use change associated with UWF Other Activities, therefore noticeable effects on amphibians or reptiles not likely to occur. No evidence of amphibian or reptile species was recorded from habitat or other surveys of the UWF Other Activities locations.

8.10.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.10.2.3.1 Element 2: UWF Related Works

Common Frog: Extrapolated data primarily from the 2011 National Frog Survey (Reid *et al.,* 2013), does not indicate any distribution of this species within either 10km square overlapping the UWF Related Works (R95 and R96). Frogs were previously recorded in Knockmaroe, Grousehall and Foilnaman (Upperchurch Windfarm EIS 2013).

Common Lizard was recorded in suitable habitat (acid grassland) within the UWF Related Works study area boundary.

Smooth Newt: No Smooth Newt was noted, but is considered as likely to occur in suitable habitat.

8.10.2.3.2 Element 3: UWF Replacement Forestry

Extrapolated data primarily from the 2011 National Frog Survey (Reid *et al.,* 2013), does not indicate any distribution of this species within the 10km square which overlaps the UWF Replacement Forestry (R96).

No amphibians or reptiles were recorded from site visits to the UWF Replacement Forestry lands, however as Common Lizard was recorded in suitable habitat (acid grassland) within the adjacent UWF Related Works study area, it is considered that this species is likely to occur on the UWF Replacement Forestry lands also.

8.10.2.3.3 Element 4: Upperchurch Windfarm

Upperchurch Windfarm: As per the 2013 EIS, Common Frog is described from a number of locations within the Upperchurch Windfarm. Common Lizard was also recorded in suitable habitat in acid grassland within the Upperchurch Windfarm site. This species has not been previously recorded in the study area (NBDC, 2016). The location of these survey records are identified on Figure WP 8.10: Whole Project Study Area for Amphibians & Reptiles.

Consideration of the Passage of Time: The makeup of suitable habitat for Amphibians & Reptiles on the Upperchurch Windfarm site has not materially changed since 2012/2013, and surveys for UWF Related Works confirmed a low usage of the windfarm area by these species. Therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this 2019 EIAR for UWF Grid Connection.

8.10.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 8.10.2.2.1.

8.10.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.10.2.1.

8.10.3 PROJECT DESIGN MEASURES for Amphibians & Reptiles

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

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

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

The Project Design Measures outlined in Table 8-82 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Amphibians & Reptiles**.

Table 8-82: UWF Grid Connection Project Design Measures relevant to Amphibians & Reptiles

PD ID	**Project Design Environmental Protection Measure (PD)**
PD04	All construction works will be carried out during daylight hours.
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).
PD68	As amphibians and reptiles will use brash piles for refuge and hibernation, all logs/brash created from hedgerow/tree removal at the Mountphilips Substation site will be removed off site immediately to prevent disturbance to amphibians/reptiles which may use brash piles if left in situ.

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

8.10.4 EVALUATION OF IMPACTS to Amphibians & Reptiles

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

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

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

Table 8-83: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
No impacts included for evaluation	*Habitat degradation (compaction, change in drainage), (construction stage)*
	Reduction in foraging and breeding habitat, (construction stage)
	Disturbance/Displacement, (construction stage)
	Physical injury/destruction of individual amphibians and reptiles, (construction stage)
	Operational Stage/Growth Stage
	Decommissioning Stage

The source-pathway-receptor links and the rationale for excluded impacts are described in **Section 8.10.4.1**.

8.10.4.1 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-84 below.

Table 8-84: Description and Rationale for Excluded Impacts to Amphibians & Reptiles

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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage /Planting Stage				
Permanent Land cover Change	2, 4	Soils/ Surface Water	Habitat degradation (compaction, change in drainage)	Evaluated as Excluded: No compaction or habitat degradation likely as a result of Element 1 or 3. Construction Works associated with Element 2 and 4 may result in some secondary effects on habitat composition for amphibians and reptiles, however the spatial extent of this will be Negligible and any habitat degradation effects to local populations are likely to be Neutral.
Permanent Land cover Change	1,2,3,4	Landcover	Reduction in foraging and breeding habitat	Evaluated as Excluded: In relation to Element 1,2, 4 - It is likely that the Construction Works will include some land-use change of suitable foraging or breeding habitat. In relation to Element 1, permanent land-use change of non-linear habitat features at the Mountphilips site will comprise 1.75Ha in total, of which 1.7ha (97%) is improved agricultural grassland (GA1), with the remaining 0.05ha or 3% comprising wet grassland (GS4), wet grassland is considered suitable foraging habitat for amphibians and reptiles. The extent of any reduction is considered negligible in the context of availability of habitats in the immediate surrounding area. Amphibians and Reptiles use woodland habitats, therefore hedgerows and treelines could be considered suitable habitat. In relation to Element 1; with respect to linear features such as treelines and hedgerow, it will be necessary to remove 160m of treeline which includes 17 immature trees and 1 mature tree at the Mountphilips Substation site entrance to widen the entrance and provide sightlines. These will be reinstated by planting the equivalent amount of hedgerow and/or trees behind the new sightlines. It will be necessary to remove 40m of hedgerow which includes 11 immature trees to build the new access road. A new hedgerow, c.700m in length, will be planted on the berms on either side of the new permanent access road between the Site Entrance and Mountphilips Substation and around the Mountphilips Substation compound, and a mix of native grasses and wildflowers will be sown on the sides of the berms, for the benefit of biodiversity in the area. All new hedging will be locally sourced native hedgerow species, and the replacement trees will be native hedgerow species and at least 10 years old. Considering the reinstatement/replacement of lost hedgerow/treelines at the Mountphilips Substation site and in the context of

Amphibians & Reptiles

Sensitive Aspect

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				available habitat and low occurrence of species as described herein, any effects will be Neutral. The extent of permanent land-use change as a result of Elements 2,3 and 4 is evaluated as negligible in the context of available habitat and low occurrence of species as described herein. The spatial extent of any loss will be limited to works within the construction boundary comprising permanent features, and therefore effects on amphibians or reptiles will be Neutral. Temporary land-use change at the Mountphilips Substation site (relates to temporary access road to End Masts, temporary crane hardstand area at End Masts and temporary construction compound) during construction will comprise 0.2ha of improved agricultural grassland (GA1), this habitat is considered unsuitable for amphibians and reptiles. In relation to Element 2, 4 - any other habitat loss is temporary. It is evaluated that the context of available habitat and low occurrence of species, effects will be Neutral.
Noise and human activity	1,2,3,4	Visibility	Disturbance/Displacement	Evaluated as Excluded: Construction works and activities may result in some cross-factor effects from disturbance stimuli (visual and vibration related), however the spatial extent, limited frequency, and brief duration will be Negligible and effects to local populations are likely to be Neutral.
Operating Machinery	1,2,3,4-++++	Direct Contact	Physical injury/ mortality of individuals	Evaluated as Excluded: no likely impacts as use of machinery will be during daylight hours, survey ahead of vegetation clearance and removal of brash. No machinery use associated with UWF Replacement Forestry.
Operational Stage / Growth Stage				
Evaluated as Excluded: Operational Stage works or activities will cause Negligible source magnitude or duration of effects, and any effects on amphibians and reptiles are expected to be Neutral.				
Decommissioning Stage				
Evaluated as Excluded: Populations of amphibians and reptiles are evaluated as Low Sensitivity receptors. Decommissioning Works may result in some cross-factor effects from disturbance stimuli (visual and vibration related), however the spatial extent, limited frequency, and brief duration will be Negligible and any disturbance or displacement effects to local populations are likely to be Neutral.				

Biodiversity

Topic

8.10.5 Mitigation Measures for Impacts to Amphibians & Reptiles

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

8.10.6 Evaluation of Residual Impacts to Amphibians & Reptiles

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in the Description and Rationale for Excluded Impacts to amphibians & reptiles in Section 8.10.4.1, i.e. **Neutral impact.**

8.10.7 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 a Invasive Species Specialist.

8.10.8 Summary of Impacts to Amphibians & Reptiles

No impacts to Amphibians & Reptiles are concluded by the topic authors as likely to occur.

Table 8-85: Summary of the impacts to Amphibians & Reptiles

Impact to Amphibians & Reptiles	No Impact
Evaluation	*Section 8.10.4.1*
Project Life-Cycle Stage	All
UWF Grid Connection	**Neutral Impacts / No Likely Impacts**
Element 2: UWF Related Works	Neutral impacts / No likely impacts
Element 3: UWF Replacement Forestry	Neutral impacts /No likely impacts
Element 4: Upperchurch Windfarm	Neutral impacts / No likely impacts
Element 5: UWF Other Activities	No Likely Impacts - Evaluated as excluded, See Section 8.10.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	**No** Potential for Cumulative Impacts (as Neutral impacts from any individual Element)

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

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Amphibians & Reptiles with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.10.2.1).

8.11 Sensitive Aspect No.10: Marsh Fritillary

This Section provides a description and evaluation of the Sensitive Aspect –the Marsh Fritillary butterfly.

Chris Cullen, Donncha O Cathain, Jennifer Pearson, and Howard Williams were the main authors of this Section. Please see Sources of Informaiton (Section 8.1.7) and Methodology (Section 8.1.8) for details of the desktop and fieldwork surveys which have informed the evaluation of Aquatic Habitats & Species.

8.11.1 Baseline Characteristics of Marsh Fritillary

8.11.1.1 STUDY AREA for Marsh Fritillary

The study area for Aquatic Habitats & Species in relation to the UWF Grid Connection is described in Table 8-86 and illustrated on Figure GC 8.11: UWF Grid Connection Study Area for Marsh Fritillary (Volume C3 EIAR Figures).

Table 8-86: UWF Grid Connection Study Area for Aquatic Habitats & Species

Study Area for Aquatic Habitats & Species	Justification for the Study Area Extents
50m area around and incorporating the construction works areas	Professional Judgement and as per Best Practice (CIEEM, 2016).

8.11.1.2 Baseline Context and Character of Marsh Fritillary in the UWF Grid Connection Study Area

Marsh Fritillary (*Euphudras aurinia*) has a wide distribution across Ireland, but the distribution is patchy and it is still considered overlooked in some parts of its range. Colonies can be found in a variety of habitats including calcareous grassland, degraded bogs, wet heath, transition mires and fens up to 300m (Reagan *et al.,* 2010). It is the only protected butterfly species in Ireland. The population often fluctuates within its range dependant on weather, food supply and interaction with parasites. Larvae overwinter in a small web close to the ground and emerge in early spring. At a local level, populations can fluctuate highly and are subject to extremely low levels or periodic extinctions. The identification and protection of breeding sites is listed as a regional issue of concern in the Tipperary County Development Plan with inadvertent loss of previously unknown colonies an identified threat.

Previous records exist from 2 locations proximal to the Whole UWF Project, Cummer Bog near Kilcommon (<1km) and Dromsallagh, near Cappawhite (~10km). The evidence all indicates that the Marsh Fritillary is relatively sedentary, rarely dispersing beyond 750m, although colonisation may rarely take place over longer distances of 5–20 km (Warren 1994). The distance of 2km has been previously considered as a standardised 'functional landscape' i.e. the area within which most dispersal, new colonisation and regular exchange of genetic material will occur (Fowles & Smith 2006).

The Marsh Fritillary populations previously recorded in Bealaclave and Baurnadomeeny (as part of the studies for the 2018 application) are 1.2km and 1.3km to the north of the current proposed 110kV UGC route.

Survey Results: No suitable habitat for Marsh Fritillary was recorded on or adjacent (50m) to the UWF Grid Connection lands at Mountphilips Substation site. Where the 110kV UGC element of the UWF Grid Connection occurs outside of the Mountphilips Substation site, the 110kV UGC is located entirely in the paved surfaces of roads, predominately in local roads, regional road (R503) and a short section in private paved road, which are not suitable habitat for Marsh Fritillary butterfly. Field surveys during 2019 found that habitats within 50m of construction works areas along the 110kV UGC are generally of low ecological value to terrestrial invertebrates, including Marsh Fritillary, and no suitable habitat was recorded within 50m of the works.

Invertebrates

Sensitive Aspect

During 2017 surveys, three colonies of Marsh Fritillary were recorded – one colony each in Baurnadomeeny and Bealaclave townlands, both c. 1.2km north of the 110kV UGC route, with a third colony identified at Shevry which is located 1.1km south east of the UWF Grid Connection works at the Consented UWF Substation at Knockcurraghbola Commons.

The proposed UWF Grid Connection 110kV UGC route on the R503 also passes to the north of Cummer Bog complex, where previous records of Marsh Fritillary have been documented at the southern extremity, c. 800m from the R503. Numbers at this colony are cited as <10 in Nash *et al.* 2012.

The locations of these four Marsh Fritillary colonies are identified on Figure GC 8.11: UWF Grid Connection Study Area for Marsh Fritillary.

8.11.1.3 Importance of Marsh Fritillary

Marsh Fritillary is the only butterfly species resident in Ireland that is listed in Annex II of the EU Habitats Directive 92/43/EEC. The population/habitat extent recorded from the current study is evaluated as of County Importance.

8.11.1.4 Sensitivity of Marsh Fritillary

Marsh Fritillary is sensitive to habitat loss, directly through land take or indirectly through compaction from vehicular movement. Individuals are considered as sensitive to vibrations on a precautionary basis. At the webbing stage larvae are sensitive to habitat disturbance and direct mortality from contact with machinery. Marsh fritillary habitat is sensitive to land cover change from drainage regime modification, the application of nutrients, higher intensities of grazing, the introduction of invasive species and alteration of physical structure. At a landscape level habitat fragmentation may affect population function at a larger scale (Asher *et al.,* 2001).

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

The species was assessed as having an 'Inadequate' conservation status with an overall declining conservation trend in the most recent Article 17 report (NPWS, 2019) as required under the EU Habitats Directive 92/43/EEC. Within the Article 17 report, the range was assessed as 'favourable', the population was assessed as 'inadequate' with a qualifier of declining, habitat was assessed as 'favourable' and future prospects as 'inadequate' with a qualifier of declining. The species is classified as vulnerable due to a population decline of ≥ 30 percent (A2c) in the Irish Red List for Butterflies (Reagan *et al.,* 2010). Its conservation status is classified as least concern in a European context (Van Swaay *et al.,* 2010). Overall the trend in conservation status has changed since the last Article 17 report in 2013 with the trend classified as 'improving'.

Given the trends presented above, a scenario in which this project does not take place would result in a continuation of current trends relating to Marsh Fritillary, within the study area, in line with the decline cited above in respect of future prospects.

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8.11.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to invertebrates, particularly Marsh Fritillary, as identified above, will be the receiving environment at the time of construction given the short time period likely to elapse in the interim.

8.11.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.11.2.1 Cumulative Evaluation Study Areas

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 Marsh Fritillary	Justification for the Study Area Extents
2km from UWF Grid Connection for cumulative effects with Other Projects and Activities	The distance of 2km has been previously considered as a standardised 'functional landscape' i.e. the area within which most dispersal, new colonisation and regular exchange of genetic material will occur (Fowles & Smith 2006).

The study is illustrated on Figure CE 8.11 UWF Grid Connection Cumulative Evaluation Study Area for Marsh Fritillary.

8.11.2.1.1 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 8.11.2.2.1 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 8-87 and illustrated on Figure WP 8.11: Whole Project Study Area for Marsh Fritillary (Volume C3 EIAR Figures).

Table 8-87: Cumulative Evaluation Study Area for Marsh Fritillary

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	50m area around and incorporating the construction works areas, afforestation lands, activity locations 2km from Whole UWF Project for cumulative effects with Other Projects and Activities	Professional Judgement and as per Best Practice (CIEEM, 2016). The distance of 2km has been previously considered as a standardised 'functional landscape' i.e. the area within which most dispersal, new colonisation and regular exchange of genetic material will occur (Fowles & Smith 2006).
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5:		

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
UWF Other Activities		

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

The evaluation of cumulative impacts to Marsh Fritillary also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Marsh Fritillary with either the UWF 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 Cumulative Evaluations (Section A2.1.4.13).

The results of this scoping exercise are that: Forestry, Agriculture and Turf-Cutting activities have been scoped in for evaluation of cumulative effects to Marsh Fritillary relating to the Other Elements.

8.11.2.2.1 Potential for Impacts to Marsh Fritillary

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Marsh Fritillary. The results of this evaluation are included in Table 8-88.

The location of the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure WP 8.11.

Table 8-88: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects due to: No suitable habitat for Marsh Fritillary was recorded on or adjacent (50m) to the UWF Replacement Forestry lands. • No potential for habitat loss or habitat degradation effects as there is no suitable habitat for Marsh Fritillary in or adjacent (50m) to the afforestation lands, • No potential for mortality of in-flight adults or in-situ larvae, as no suitable habitat or Marsh Fritillary populations were recorded within or adjacent (50m) to the afforestation lands, • No potential for disturbance or displacement effects during planting or management activities, as no suitable habitat or Marsh Fritillary populations were recorded within or adjacent (50m) to the afforestation lands and no heavy machinery is required.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects due to: No suitable habitat for Marsh Fritillary overlaps Haul Route Activity locations or the Upperchurch Hen Harrier Scheme. Marsh Fritillary was recorded proximal to Overhead Line Activities on Shower Bog in 2001. The exact location is unknown however no suitable habitat exists at structure locations in close proximity along the Overhead Line route.

Other Project or Activity	
Activities: Forestry/Agriculture/Turf-Cutting	Yes, included for the evaluation of cumulative effects (Forestry is included as afforestation is a source of habitat loss in the surrounding area).

8.11.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.11.2.3.1 Element 2: UWF Related Works

Suitable habitat for Marsh Fritillary overlaps UWF Related Works construction works areas at Shevry, where cabling as part of UWF Related Works are to be placed under roads consented as part of the Upperchurch Windfarm.

Habitat for Marsh Fritillary to the extent of 0.54Ha is present at Shevry, of which 0.062Ha (11.5%) overlaps the construction works area. Evidence of breeding in the form of larval webbing was recorded at 4 locations within this habitat in September 2017 - all outside the works area boundary. A parasitic Braconid wasp of the genus *Cotesia* was also recorded. This species can be an influencing factor in local level population fluctuations and may be a limiting factor in records of the species from this location. This colony size is classified as (Small i.e. the predicted peak population is <100 adults) and is located 10.7km east of Baurnadomeeny and 12.1km east of Bealaclave (where populations of Marsh Fritillary were recorded during 2017 surveys).

The location and extent of Marsh Fritillary habitat and species is illustrated on Figure WP 8.11: Whole Project Study Area for Marsh Fritillary.

8.11.2.3.2 Element 3: UWF Replacement Forestry

Not applicable –evaluated as excluded. See Section 8.11.2.2.1.

8.11.2.3.3 Element 4: Upperchurch Windfarm

Habitat for Marsh Fritillary at Upperchurch is the same habitat identified in relation to the UWF Related Works above– i.e. 0.54Ha is present at Shevry, of which 0.062Ha (11.5%) overlaps the construction works area for both the Upperchurch Windfarm and the UWF Related Works (the Internal Windfarm Cabling will be constructed within the new windfarm road at this location).

Consideration of the Passage of Time: The makeup of suitable habitat for Marsh Fritillary on the Upperchurch Windfarm site has not materially changed since 2012/2013, and surveys for UWF Related Works confirmed a low usage of the windfarm area by these species. Therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this 2019 EIAR for UWF Grid Connection.

8.11.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded – see Section 8.11.2.2.1.

8.11.2.3.5 Other Projects or Activities

During 2017 surveys, three colonies of Marsh Fritillary were recorded (all on agricultural grassland) – one colony each in Baurnadomeeny and Bealaclave townlands, both c. 1.2km north of the 110kV UGC route, with a third colony identified at Shevry which is located 1.1km south east of the UWF Grid Connection works on the UWF Related Works/Upperchurch Windfarm sites (as described above). There is a large separation distance between the colony at Shevry and those at Baurnadomeeny (10.7km) and Bealaclave (12.1km).

In addition to the three colonies identified above, other colonies may occur in wet grassland (agriculture) but are unlikely to be present in forestry lands.

A fourth colony is recorded at Cummer Bog, where previous records of Marsh Fritillary have been documented at the southern extremity, c. 800m from the R503. Numbers at this colony are cited as <10 in Nash *et al.* 2012. Cummer Bog is subject to on-going peat extraction (turf cutting). The distance between the Cummer Bog colony and the Shevry colony is greater than 5km.

8.11.3 PROJECT DESIGN MEASURES for Marsh Fritillary

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

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

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

No Project Design Measures are relevant to the sensitive aspect, **Marsh Fritillary butterfly**.

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

8.11.4 EVALUATION OF IMPACTS to Marsh Fritillary

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

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

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

Table 8-89: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Habitat Loss (construction stage)	*Habitat Degradation (Introduction of invasive alien species which may out-compete food plants such as DBS), (construction stage)*
	Habitat degradation (drainage alteration) - Marsh Fritillary, (construction stage)
	Habitat degradation (Compaction) - Marsh Fritillary, (construction stage)
	Mortality to in-flight MF Adults through contact with machinery, (construction stage)
	Potential disturbance/displacement from Vibration, (construction stage)
	Mortality of in situ Larvae, (construction stage)
	Potential disturbance/displacement of Marsh Fritillary individuals breeding in suitable habitat proximal to the Whole UWF Project during maintenance, (construction stage)
	Decommissioning Stage

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Table, which is presented in the following **Section 8.11.4.1.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Tables, in Section 8.11.4.2.

8.11.4.1 Impact Evaluation Table: Habitat Loss

Impact Description for the Other Elements of the Whole UWF Project	
Project Life Cycle Stage:	Construction stage
Cumulative Impact Source: Excavation Works Impact Pathway: Land Cover Impact Description: Marsh Fritillary is a medium sensitivity receptor of County Importance. Permanent land cover change or loss of Marsh Fritillary habitat such as Devils-Bit scabious rich swards may result in the loss of habitat 'patches' reducing the size of individual colonies or reducing meta-population connectivity; which can cause secondary, population level declines. Management prescriptions to be implemented as part of the Upperchurch Hen Harrier scheme, such as a limitation on the excavation of drains, will allow improved grassland to revert back to wet grassland/semi-natural grassland habitats and possibly further Marsh Fritillary habitat, meta-population interconnectivity. Impact Quality: Negative.	
Evaluation of the Subject Development Impact – Habitat Loss	
Element 1: UWF Grid Connection – direct/indirect impact	
Impact Magnitude: There is no potential for any loss of suitable habitat due to the construction of the UWF Grid Connection as no suitable habitat for Marsh Fritillary was recorded on or adjacent (50m) to the UWF Grid Connection lands at Mountphilips Substation site or along the 110kV UGC route, during habitat surveys in January and May 2019; The risk of indirect habitat degradation caused by the inadvertent spread of invasive species by quarry vehicles delivering stone to various UWF Grid Connection works locations, is avoided with the implementation of Project Design measures in line with the bespoke Invasive Species Management Plan for UWF Grid Connection, Measures will include confirmatory surveys and the covering of infestations with terram at all identified locations prior to any works commencing, along with the supervision of works by an invasive species specialist.	
Significance of the Impact: No Likely Impact	
Rationale for Impact Evaluation: • No suitable habitat for Marsh Fritillary was recorded on or adjacent (50m) to the UWF Grid Connection lands at Mountphilips Substation site and the 110kV UGC route, during habitat surveys in January and May 2019; • The 110kV UGC outside of the Mountphilips site is predominately on the paved surface of public roads, therefore there is no suitable habitat for Marsh Fritillary within 110kV UGC Construction Works Areas. • Implementation of a bespoke Invasive Species Management Plan for UWF Grid Connection.	
Element 1: UWF Grid Connection – cumulative impact	
Cumulative Impact Magnitude: There is no potential for cumulative habitat loss as the UWF Grid Connection will not cause any habitat loss in itself. The risk of indirect habitat degradation caused by the inadvertent spread of invasive species by quarry vehicles delivering stone to various UWF Grid Connection works locations and also to UWF Related Works and Upperchurch Windfarm works locations (particularly in Shevry which contains a small population of Marsh Fritillary butterfly) is avoided through the implementation of a bespoke Invasive Species Management Plan will avoid source impacts from the UWF Grid Connection. Measures will include confirmatory surveys and the covering of infestations with terram at all identified locations prior to any works commencing, along with the supervision of works by an invasive species specialist.	
Significance of the Impact: No Likely Impact	
Rationale for Impact Evaluation:	

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- No Marsh Fritillary habitat identified within 50m of UWF Grid Connection works during habitat surveys in January and May 2019;
- Implementation of a bespoke Invasive Species Management Plan for UWF Grid Connection.

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

Element 2: UWF Related Works

Impact Magnitude:
Habitat for Marsh Fritillary to the extent of 0.54Ha is present at Shevry, of which 0.062Ha (11.5%) overlaps the construction works area. Evidence of breeding in the form of larval webbing was recorded at 4 locations within this habitat in September 2017 - all outside the works area boundary. Permanent land cover change of 0.062Ha or 11.5% of suitable habitat present will occur during the construction stage along a section of Internal Windfarm Cabling in Shevry.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The magnitude of the habitat loss: evaluated as medium (5-20% of habitat present), and;
- The absence of webs within the habitats to be removed and low overall number present, and;
- The contrast to the baseline environment represents a partial change to baseline attributes, and;
- The long-term nature of the loss, and;
- The low reversibility of the identified effect.
- Implementation of a bespoke Invasive Species Management Plan for UWF Related Works.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.11.2.2.1.*

Element 4: Upperchurch Windfarm

Impact Magnitude:
Permanent land cover change of 0.062Ha (620m^2) or 11.5% of suitable habitat present at the location will occur during the construction stage.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The magnitude of the habitat loss: evaluated as medium (5-20% of habitat present), and;
- The absence of webs within the habitats to be removed and low overall number present, and;
- The contrast to the baseline environment represents a partial change to baseline attributes, and;
- The long-term nature of the loss, and;
- The low reversibility of the identified effect

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.11.2.2.1.*
(Although it should be noted that the management prescriptions to be implemented as part of the Upperchurch Hen Harrier scheme, such as a limitation on the excavation of drains, will allow improved grassland to revert back to wet grassland/semi-natural grassland habitats and possibly further Marsh Fritillary habitat, meta-population interconnectivity).

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Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Forestry /Agriculture/Turf-cutting in the surrounding area

Impact Magnitude:
Afforestation can result in direct habitat loss for Marsh Fritillary of suitable habitat. Afforestation within the geographical study zone is considered unlikely to result in significant habitat loss; as much of the suitable habitat is within the Slieve Felim to Silvermines SPA and afforestation will be limited.

Agriculture: Two small populations have been previously recorded (Inis, 2017) in Agricultural lands at Bealaclave and Baurnadomeeny. Agricultural activities such as reclamation (land cover change) can cause habitat loss, however agricultural activities are considered unlikely to result in any contrast to baseline activities.

Whilst turf-cutting can directly remove suitable habitat. A corollary of this is that suitable habitat for Marsh Fritillary often exists on the margins of cutover bog due to the grassland structure brought about from peat extraction. One colony has been recorded (Nash *et al*, 2012) at Cummer Bog. Cummer bog is subject to peat extraction and therefore Marsh Fritillary habitat loss is considered. The probability of Habitat Loss is evaluated as High on a precautionary basis. In the absence of predictive estimates on extraction the magnitude of habitat loss is evaluated as High (20-80% pf population or habitat change).

Significance of the Impact: Moderate

Rationale for Impact Evaluation:

- The likely continuance of Peat Extraction in Cummer Bog

Evaluation of Other Cumulative Impacts – Habitat Loss

Whole UWF Project Effect

Cumulative Impact Magnitude:
No populations of Marsh Fritillary or suitable supporting habitat was identified within 50m of the 110kV UCG route (UWF Grid Connection). Therefore, there is no potential for likely cumulative direct habitat loss effects to Marsh Fritillary associated with the UWF Related Works/Upperchurch Windfarm colonies and the UWF Grid Connection.
Suitable habitat for this sensitive receptor of County Importance is present within the Whole Project Cumulative Evaluation Study Area at a location in Shevry where UWF Related Works and Upperchurch Windfarm are both located. 0.062ha will be lost within the UWF Related Works and Upperchurch Windfarm elements. As the works areas overlap at this location, there is no potential for cumulative effects between the UWF Related Works and the Upperchurch Windfarm (the effect will only occur once).

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- The overall extent and degree of Habitat loss in respect of a County Important receptor, and;
- The long-term nature of the loss, which is offset by;
- The absence of webs in the habitats to be lost.

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

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

Significance of the Cumulative Impact: Moderate

Rationale for Cumulative Impact Evaluation:

- The overall extent and degree of Habitat loss from the Whole UWF Project and Turf Cutting activities;
- County Important of Marsh Fritillary;
- The separation distance between colonies at Shevry and Cummer Bog, means cumulative impacts are unlikely
- The long-term nature of the loss, and;
- The likely continuance of peat extraction at the nearest known colony within the study zone.

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8.11.4.2 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-90 below.

Table 8-90: Description and Rationale for Excluded Impacts to Marsh Fritillary

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

Source(s) Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Movement of soils and machinery	2,4	Soils	Habitat Degradation (Introduction of invasive alien species which may out-compete food plants such as Devils Bit Scabious.)	Evaluated as Excluded: Marsh Fritillary is a medium sensitivity receptor of County Importance. Should invasive species be spread to areas containing Marsh Fritillary, these species could potentially out-compete the Devils-Bit scabious plants, degrading the habitat available to Marsh Fritillary. In relation to UWF Grid Connection: There are a number of invasive plant species in the verges and on adjacent lands to the public road pavements on the 110kV UGC route. There is no Marsh Fritillary habitat within any UWF Grid Connection construction works areas. In relation to UWF Related Works and Upperchurch Windfarm: no invasive species of Flora are present within construction works areas that overlap Marsh Fritillary habitat within the UWF Related Works/Upperchurch Windfarm construction works areas at Shevry. The risk of indirect habitat degradation caused by the inadvertent spread of invasive species by quarry vehicles delivering stone to either UWF Grid Connection locations, is minimised with the implementation of Project Design measures and the implementation of the bespoke Invasive Species Management Plan for UWF Grid Connection and the bespoke Invasive Species Management Plan for UWF Related Works. The implementation of the two ISMPs will prevent these elements acting as a source of effects (either alone or in combination) along this pathway. These measures will be implemented prior to any works commencing on the projects. It is therefore evaluated that there is extremely low probability of invasive flora being transferred to habitat patches present e.g. at Shevry, and therefore effects are unlikely to occur.
Landuse Change	1,2,4	Surface Water	Habitat degradation (drainage alteration)	No potential for effects/Neutral effects: In respect of the UWF Grid Connection 110kV UGC, no potential for effects to Marsh Fritillary are expected due to the absence of populations and suitable supporting habitat within 50m of the 110kV UGC route. In respect of UWF Related Works/Upperchurch Windfarm habitat patches/colony: Neutral

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Source(s) Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				impacts due to the implementation of surface water management at Shevry for Upperchurch Windfarm will maintain surface water flows to down-gradient areas of habitat.
Movement of Soils and Machinery	2,4	Soils	Habitat degradation (Compaction)	Evaluated as Excluded; In relation to Elements 2&4 - Vehicular movement will be limited to temporary and permanent roads within the construction area boundaries, the effect of which is appraised under Habitat Loss.
Excavation Works	1,2,4	Ground and Air Vibrations	Potential disturbance/displacement from Vibration	In relation to Elements 2, 4 - Low levels of ground and air vibrations are expected to be detectable within the immediate vicinity (1-5m) of tracking machines. A maximum estimate is (0.5 to 1mm/s). There is a low probability of this affecting in situ Marsh Fritillary. Zero webs were located within the 5m buffer zone of vehicular usage (at Shevry). Neutral effects are considered likely.
Excavation Works	1,2,4	Excavations	Mortality of In-Situ larvae	No Impact: Project Design Measures, Reference Documents Volume F2 Chapter 5 PD43, which involve relocating any Marsh Fritillary larvae will avoid mortality of in-situ larvae at UWF Related Works/Upperchurch Windfarm construction works area in Shevry. In respect of the UWF Grid Connection 110kV UGC, no effects to Marsh Fritillary are expected due to the absence of populations and suitable supporting habitat within 50m of the UGC route.
Operational Stage				
Operating Machinery	1,2,4	Direct Contact	Mortality to in-flight Marsh Fritillary Adults through contact with machinery	Evaluated as Excluded; In respect of the UWF Grid Connection 110kV UGC, no effects to Marsh Fritillary are expected due to the absence of populations and suitable supporting habitat within 50m of the 110kV UGC route, and due to the small scale of operational works being carried out by 1-2 people using small vehicles, with operational activities being carried out from hard surfaces In relation to Elements 2&4 - It is considered as extremely unlikely that the short duration of the works period close to any Marsh Fritillary colony will result in this secondary effect. No contrast to baseline conditions (e.g. the presence of operating farm machinery) is expected. Neutral effects are considered likely.
Machinery Movement	2,4	Ground and Air Vibrations	Potential disturbance/displacement of Marsh Fritillary individuals breeding in suitable habitat proximal to	Evaluated as Excluded: Maintenance, comprising 1-2 people travelling in light vehicles along new/existing roads or walking over lands over cable routes (4) will have Neutral effect.

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Source(s) Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
			maintenance activities	
Decommissioning Stage				
Evaluated as Excluded: In relation to 2, 4 -Neutral effects on Marsh Fritillary are considered likely due to the scale of works required, with works taking place from hardstanding areas, and the windfarm access roads expected to remain in place. No decommissioning works in relation to project 1 or 3.				

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Topic

8.11.5 Mitigation Measures for Impacts to Marsh Fritillary

Mitigation measures were incorporated into the UWF Grid Connection project design. No additional mitigation measures are required as the topic authors conclude that **significant impacts are not likely to occur to Marsh Fritillary** as a consequence of the UWF Grid Connection.

8.11.6 Evaluation of Residual Impacts to Marsh Fritillary

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Marsh Fritillary above (Section 8.11.4.1) – i.e. **no significant adverse impacts**.

8.11.7 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 a Invasive Species Specialist.

8.11.7.1 Invasive Species Management Plan

The UWF Grid Connection Environmental Management Plan will include a bespoke Invasive Species Management Plan developed to prevent/avoid the introduction and/or spread of invasive species. The Invasive Species Management Plan includes Best Practice biosecurity measures and describes supervision by an Invasive Species Specialist during the construction phase.

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8.11.8 Summary of Impacts to Marsh Fritillary

No impacts to Marsh Fritillary are concluded by the topic authors as likely to occur as a consequence of the development of UWF Grid Connection.

Table 8-91: Summary of the impacts to Marsh Fritillary

Impact to Marsh Fritillary:	**Habitat Loss**
Evaluation Impact Table	*Section 8.11.4.1*
Project Life-Cycle Stage	Construction
UWF Grid Connection *Direct/indirect impact*	**No Likely Impact**
UWF Grid Connection *Cumulative impacts*	**No Likely Impact**
Element 2: UWF Related Works	Slight
Element 3: UWF Replacement Forestry	No Potential for Impacts - Evaluated as Excluded, see Section 8.11.2.2.1
Element 4: Upperchurch Windfarm	Slight
Element 5: UWF Other Activities	No Potential for Impacts - Evaluated as Excluded, see Section 8.11.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	Slight
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Forestry and Agriculture activities in the surrounding area, Turf-Cutting	Moderate

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

8.12 Reference List

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