UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Executive Summary of the EIAR Chapters

ECOPOWER

October 2019

Contents

Topic **Executive Summaries**

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.**

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

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.