UWF Grid Connection

EIA Report (2019)

Volume C1: Non-Technical Summary

October 2019

Contents

List of Figures

Figures can be found at the end of this Non-Technical Summary

Glossary of Terms

EIA	Environmental Impact Assessment
UGC	Underground Cable
Whole UWF Project	Element 1: UWF Grid Connection; Element 2: UWF Related Works (in planning); Element 3: UWF Replacement Forestry (already licenced); Element 4: Upperchurch Windfarm (already received planning permission) and Element 5: UWF Other Activities that do not need planning permission.

NTS of Chapter 1: Introduction

1.1 The Non-Technical Summary

This is the **Non-Technical Summary** of the **Environmental Impact Assessment Report** (EIA Report) which has been submitted with the **Planning Application to An Bord Pleanála** for **UWF Grid Connection** (Upperchurch Windfarm Grid Connection).

The Non-Technical Summary has been compiled and written by Phil Kenealy, EIAR Coordinator. It is written in non-technical language, avoiding technical terms, detailed data and scientific discussion. The aim is that the Non-Technical Summary is understandable to a lay member of the public, who does not have a background in the environment or in-depth knowledge of the development itself.

The Non-Technical Summary provides a summary description of the development, the environment in which it will be located, the effects that it will have on that environment, proposals to lessen any negative effects and the end result after the development is built. It also sets out how the studies in the EIA Report were conducted.

This Non-Technical Summary is set out as follows

1) Section 1: An **introduction to this planning application** and a description of the UWF Grid Connection project that is being applied for,
2) Section 2: A description of the EIA Report and the **process governing EIA** in the planning process,
3) Section 3: The **people consulted about the development** and the area before the EIA Reports were prepared,
4) Section 4: The **different options** that were considered for the new substation and the underground cables,
5) Section 5: A **description of the development** for which this application is being made,
6) Section 6 – 17: A **summary, chapter by chapter** of the EIA Report's **12 scientific topic chapters**,

Note: The numbering in these sections will facilitate the reader who wants more in-depth or scientific information, to find the relevant chapter or appendix in the EIA Report, because they will have the same section/chapter numbering. For example 'Material Assets – Roads' is covered in **Section 15 of this Non-Technical Summary** document and in **Chapter 15; Figure 15 and Appendix 15 of the EIA Report**.

7) Section 18: A **summary conclusion of any cross-factor effects** between the environmental topics.
8) Section 19: A summary of the **monitoring arrangements and mitigation measures** for the construction and operational stages.
9) Section 20: **A Summary Conclusion**

1.2 The Planning Application

This Planning Application is called UWF Grid Connection because it is the Grid Connection part of a larger project, Upperchurch Windfarm (UWF). **Upperchurch Windfarm is shortened to UWF throughout this Report**. This Application is the 2nd Application for UWF Grid Connection to be called UWF Grid Connection 2019. The previous application (2018 Application) was refused by An Bord Pleanála on 17th December, 2018 (ABP-301959-18) because the Board considered that the proposed underground cable route cross-country

(connecting the windfarm substation to the ESB Grid) was not suitable when consideration was given to the Hen Harrier bird. This 2019 Application is technically the same as the previous application, except that the route of the underground cable has changed from a generally underground cross-country route, to a generally underground public road route.

An Bord Pleanála has decided that this **UWF Grid Connection** Planning Application must be lodged directly with An Bord Pleanála, not with Tipperary County Council. This is because high voltage electrical infrastructure is considered to be **Strategic Infrastructure** for the purposes of applying for planning permission. People can still make submissions on this Application, but these submissions must go directly to An Bord Pleanála, instead of Tipperary County Council.

The full planning application to An Board Pleanála includes **Planning Drawings**; the **Environmental Impact Assessment Report** (called the EIA Report), this **Non-Technical Summary**; **Figures** and **Appendices** for each chapter of the EIA Report; an **Environmental Management Plan** for the development; a **Natura Impact Statement** on the effect on protected European Sites (SPAs, SACs) and **Reference Documents** (including those for assessment of in-combination effects with other projects).

1.3 The Proposed Development

The proposed development, UWF Grid Connection, comprises the following elements:

- A new electrical substation in Mountphilips townland, near Newport, connected to the existing Killonan to Nenagh overhead electricity line.
- Connecting the new substation in Mountphilips by circa.30km in length of underground electrical and telecoms cables, to Upperchurch Windfarm substation, in Knockcurraghbola Commons.

Note*:* Upperchurch Windfarm is not built yet. The windfarm was granted planning permission in August 2014 and includes twenty-two wind turbines and an electrical substation. The windfarm substation is to be built in Knockcurraghboola Commons, generally in the centre of the windfarm.

1.4 The Purpose of the Development

The purpose of UWF Grid Connection is to connect Upperchurch Windfarm substation to a new substation at Mountphilips (which will be connected to the existing overhead line) and thereby **export electricity from Upperchurch Windfarm when constructed and operational, to the National Grid**.

1.5 The Location and Brief Description of the Development

New Substation: The new substation is proposed for a grass field in Mountphilips townland, 2km north of Newport, County Tipperary and 23km west (as the crow flies) of Upperchurch Windfarm. The new substation will be within a fenced compound, which will contain a control building and indoor and outdoor substation electrical equipment. The new substation will have Two End Masts to be built outside the substation compound, under the existing Killonan – Nenagh overhead line. The End Masts will be connected directly to the existing overhead line and also directly to the new Mountphilips substation. The new substation will also be connected to the windfarm substation (by the underground cable). This will allow the windfarm to export electricity, through the new substation, to the National Grid.

Underground Cable (called UGC): The new substation will connect to Upperchurch Windfarm substation by underground cables, 30.5km in length. The route of the underground cable is mostly along the Regional Road R503 (Limerick to Thurles Road). The route follows the Local Road network from the entrance off the public road for Mountphilips Substation at Coole townland, to a point on the eastern outskirts of Newport Town at Newport GAA Club on the Limerick to Thurles Road, thus avoiding Newport Town. From that point, the route follows the R503 eastwards for 22km as far as the turn-off at Knockmaroe townland, onto the Borrisoleigh Road and then along the local road network and a private paved road for a short stretch (3km), to the site of the windfarm substation.

The location of UWF Grid Connection is illustrated on Figure NTS 1: Location of UWF Grid Connection to be found at the end of this document.

1.6 The proposed development as part of the Whole Upperchurch Windfarm Project

UWF Grid Connection is Element 1 of a whole project which has the following other elements – Element 2: UWF Related Works; Element 3: UWF Replacement Forestry; Element 4: Upperchurch Windfarm (UWF) and; Element 5: UWF Other Activities. These are collectively referred to as the **Whole Upperchurch Windfarm Project (Whole UWF Project).**

An Environmental Impact Assessment Report was also prepared to accompany planning applications to the relevant Planning Authorities for **Element 2 - UWF Related Works** (Tipperary County Council – at present under appeal to An Bord Pleanála) and **Element 3: UWF Replacement Forestry** (Department of Agriculture, Food and the Marine – forestry licence granted in November 2018); **Element 4 – Upperchurch Windfarm** (granted planning in August 2014). UWF Other Activities are the types of activities that do not require planning permission, but are included in the EIA Report as part of the cumulative or in-combination assessment.

The vast majority of the **Whole Upperchurch Windfarm Project is located in County Tipperary** with some minor activities along the Upperchurch Windfarm turbine component haul route and on the existing Killonan to Nenagh overhead line, in County Limerick (these activities are part of UWF Other Activities). The majority of the interaction of the various elements of the Whole Project occur in and around the already consented Upperchurch Windfarm, in Knocknabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands townlands.

The location of each Element of the Whole Upperchurch Windfarm Project is illustrated on:

Figure NTS 2: Location of the UWF Grid Connection and the Other Elements of the Whole UWF Project found at the end of this document.

1.7 The Applicant

Ecopower Developments Limited is part of the Ecopower Group of specialist on-shore wind energy development and windfarm operation companies, and has been involved in wind energy developments in Ireland since 1996. www.ecopower.ie

NTS of Chapter 2: The EIA Report Process

2.1 Why is this EIA Report required?

UWF Grid Connection is part of the Whole Upperchurch Windfarm Project, one element of which, the Upperchurch Windfarm, did require that Tipperary County Council carry out an **Environmental Impact Assessment (EIA)**. Therefore An Bord Pleanála must now carry out a cumulative (in-combination) assessment of the Whole Upperchurch Windfarm Project, including UWF Grid Connection (the development being applied for here). Ecopower Developments has prepared an EIA Report so that An Bord Pleanála have enough information to carry out an EIA.

2.2 What topics does the EIA Report cover and who are the authors?

The promoter prepares an EIA Report by appointing an EIA Report Coordinator, who arranges all the works and reports for the planning application; appoints engineering and scientific experts for The Project Design Team and the EIA Report Team and; co-ordinates the assembly and presentation of the EIA Report. Julie Brett and Phil Kenealy of Ecopower Developments are the EIA Report Coordinators for the UWF Grid Connection project.

In the EIA Report, the following environmental factors or topics are examined by experts in the field – **Population** (including economic benefits)**; Human Health; Biodiversity** (Plants and Animals); **Land; Soils; Water; Air** including air quality, noise & vibration and electromagnetic fields; **Climate** (including climate change benefits)**; Material Assets including Built Services** (Electricity Network, Communication Network, Water Supply Infrastructure) **and Roads** (including Traffic)**; Cultural Heritage** (archaeology) **and Landscape**. Each topic has a dedicated chapter and was prepared by specialists who are competent in their field of expertise. The topic experts are identified at the start of each topic section of this Non-Technical Summary. The EIA Report **presents the likely effects of the proposal by itself and with other development, on the topics listed**.

2.3 Key Activities in the preparation of the EIA Report

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

- An **introductory description of the proposed development** was prepared by Ecopower Developments and examined by the Project Team, which included the promoter and the scientific experts.
- The **span of the topics that should be covered was investigated** by the Project Team (called scoping) through 'on the ground investigations' (fieldwork); desktop studies of guidelines and scientific publications; and consultation with environmental authorities, local and regional bodies, other interested parties, the landowners and the public.
- The **area that should be studied was identified**; potential aspects or receivers in that study area, that might be affected, were identified; and the means by which these could be affected was considered.
- **Potentially significant effects were identified**. Different locations, technologies, layouts and processes were considered for the development. Project Design Measures were developed by the experts to endeavour to lessen any potentials for significant effects.

- The **final project design** was decided and **a description prepared**. For the cumulative (in-combination) assessment, a description of consequential development i.e the environmental information for the Other Elements of the Whole Upperchurch Windfarm Project was also provided. Other projects and activities in the area were also identified.
- The effect on the environment of this **final project was evaluated in twelve topic specific chapters, by the topic specific experts**, covering the factors listed at 2.2 above. Any additional measures that were required to possibly further lessen negative effects from the development, were then suggested.
- A **cumulative evaluation** of the UWF Grid Connection in-combination with all the other Elements of the **Whole Upperchurch Windfarm Project** and, a cumulative evaluation with **other projects and activities**, relevant to the development, was carried out also.

2.4 Terminology used to describe the level of an impact

All aspects of the environment within the area, likely to be affected by the development, were identified using a combination of field surveys; desktop surveys; industry guidance (if any) on protection standards for the environmental topics and the experts' knowledge and expertise.

Taking into account the Project Design Measures, the likely ways that effects could happen to the various aspects of the environment, from the development, were identified and the size of the effect was calculated.

If it was **likely that an aspect of the environment could be affected and if that aspect could be measurably or noticeably affected, then it was evaluated in depth**.

The definitions used to describe the significance (or importance) of effects are explained in the following table;

Table 1: Significance of Effects (EPA, August 2017)

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

Note: *All effects are assumed negative unless stated otherwise.*

2.4.1 Matters evaluated as having No Effect

Some effects to the environment were considered, but due to the lack of potential or no likelihood for the effect to occur, or due to the very small or negligible size of the effect, the effect was excluded from further in-depth evaluation. The terms 'Not Likely; 'No Potential' or 'Neutral' are used to identify these effects.

Neutral is defined as: 'No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error'.

2.5 Presentation of the EIA Report

Accessibility, legibility and clarity were the key considerations when organizing the lay-out of the EIA Report Chapters.

- This Non-Technical Summary is presented in a handy, short separate volume with figures included. This is Volume C1: EIAR Non-Technical Summary.
- In Volume C2: EIAR Main Report, the information in the topic Chapters 6 to 17 is prepared by different **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. A **technical Executive Summary** is presented at the start of each Chapter.
- So that the information for the **cumulative (in-combination) evaluation** is clearly distinguishable from the information on the actual development being applied for, **all cumulative information sections are highlighted in light grey**.
- **Mapping and Illustrations, including maps, plans, sections and diagrams** are presented in a **separate volume** so that they can be prepared at a scale that is legible and so that they do not distract from the flow of the text. These are contained in – Volume C3: EIAR Figures.
- **Appendices** have been used for including detailed or supplementary information and photographs that are not core to the EIA but which nonetheless provide additional information on the matters evaluated in the chapter. These are contained in a **separate volume** - Volume C4: EIAR Appendices.

NTS of Chapter 3: The Consultations

Formal written consultation and face-to-face meetings took place with the Planning Authorities; Government Bodies and Non-Governmental Organisations (NGOs) that are likely to be concerned because of their particular interests; and The Public in the general area of development.

3.1 Principal Bodies Consulted

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

- An Bord Pleanála (Strategic Infrastructure Division)
- Tipperary County Council (Planning and Roads Department)
- Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs; Development Application Unit (DAU) - archaeology
- National Parks and Wildlife Service (NPWS) – natural heritage and ecological surveys
- Inland Fisheries Ireland (IFI) – watercourse protection at crossings and water quality protection
- Irish Water – location of Irish Water public pipes
- Transport Infrastructure Ireland (Tii) – Haul Routes and Traffic Assessments
- National Federation of Group Water Schemes – schemes in the area.

3.2 Public Consultation

As well as personal contact with landowners associated with the proposed development and landowners generally involved in Upperchurch Windfarm (UWF), part of the public consultation included a **Public Information Day.** This was organised by Ecopower Developments, in two venues - Rear Cross Community Centre and Lee's Bar, Newport Town for Friday 5th July, 2019 from 3pm to 7pm.

Also, 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

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

The planning documents submitted to An Bord Pleanála are available for inspection at their offices in 64 Marlborough St, Rotunda, Dublin 1, D01 V902 and at the offices of Tipperary County Council, Civic Offices, Nenagh, County Tipperary. In addition, all the application documents are available on the Applicant's dedicated project website at **www.upperchurchwindfarmgridconnection.ie.** The project website will also include details of the submission/observation procedure for the public and contact details of the Applicant.

NTS of Chapter 4: Alternative Options Considered

The consideration of different locations or designs for a proposed development is an exercise that must be carried out by the promoter, before the final location and design of the development is decided. The promoter must look at different options (called Alternatives) and compare these options to find the best alternative.

Different Grid Connection Location points; Overhead Line v. Underground Cable technology; different Public Road Routes for the cabling; different locations for the Mountphilips Substation; different Processes for carrying out the construction and the 'Do-Nothing' alternative was considered by the promoter for this development, before the final option or **'Alternative'** was decided.

4.1 Alternative Location Options for the Grid Connection

Our first alternative that was considered was an Alternative Location for the connection point to the National Grid.

4.1.1 The Grid Connection already granted to Upperchurch Windfarm

Upperchurch Windfarm has secured a Grid Connection Offer from ESB Networks which states that the windfarm must connect to the National Grid by the following means;-

- **A new 110kV substation node at a point along the existing Killonan to Nenagh 110kV overhead line, in the area of Mountphilips townland, near Newport, County Tipperary.**
- **An underground cable c.30km in length routed eastwards linking this new substation node back to the Windfarm Substation (already consented) at Upperchurch Windfarm.**

If the promoter of Upperchurch Windfarm wants to consider a different grid connection Node (an Alternative Location) than connecting to the existing Killonan to Nenagh overhead electricity line, the promoter must make a Modification Request to ESB Networks.

4.1.2 The Modification Request Process

There are very strict rules and conditions for applying for any modification to the connection node to the National Grid, to the one already allocated by ESB, under the Grid Connection Process. The rules are set out by Eirgrid, ESB Networks and the Commission for Regulation of Utilities (CRU). This is because the sustainable and efficient use of the national grid infrastructure underpins the Eirgrid/ESB Networks Grid Connection Process and the strategic planning of connecting new renewable electricity generation to the National Grid is complex.

Ecopower, along with our consulting electrical engineer, examined other suitable connection points to the National Grid in all directions, around the Upperchurch Windfarm site. We examined ESB substations on the Limerick/Tipperary system, in all directions around Upperchurch Windfarm – which were Killonan, Nenagh, Thurles, Tipperary and Cauteen Stations. Upperchurch Windfarm will generate a substantial amount of electricity – enough to power over 50,000 houses. We confirmed that these substations do not have the technical capacity to accept such a large amount of electricity.

From a technical, practical and sustainable use of the Transmission System perspective, Eirgrid – the System Operator will choose a grid connection point for a large high voltage generator (such as Upperchurch Windfarm), near to a major load centre as the most sustainable solution. Limerick City is the nearest place big enough to use the large amount of electricity generation from Upperchurch Windfarm and it is technically practical, efficient and sustainable to connect at the nearest point to Limerick City i.e. the existing Killonan – Nenagh overhead line. This is why a point on the existing Killonan – Nenagh overhead line, which connects back to Killonan Station on the outskirts of Limerick City, was allocated to Upperchurch Windfarm in the Grid Connection Offer, issued by ESB Networks.

Also, from Eirgrid – the System Operator's perspective, the addition of the new Mountphilips Station Node onto the existing Killonan – Nenagh overhead line will increase the Limerick/Tipperary transmission system security, increase the Killonan-Nenagh overhead line stability and improve control and protection on the system.

A Modification Request to change the connection node to the national grid, from the one allocated for Upperchurch Windfarm at Mountphilips, near the existing Killonan – Nenagh overhead line, to other ESB Stations in the Limerick/Tipperary system, would not be able to satisfy the terms and conditions of a Modification Request and was not a technically feasible viable alternative to the connection route and method proposed is this planning application.

Therefore, having examined alternative connection nodes (locations) for connecting Upperchurch Windfarm to the national grid, the connection point prescribed in the Grid Connection Agreement (a new node to be built at Mountphilips along the Limerick to Nenagh 110kV line) was considered to be the optimum location for connection to the national grid.

4.2 Alternative Grid Connection Technology Options Considered

The ESB Networks Grid Connection Agreement for Upperchurch Windfarm specifies that the electricity output from the windfarm is supplied onto the Killonan to Nenagh 110kV electricity line via an underground cable from Upperchurch Windfarm substation. If the promoter wishes to use overhead lines, a modification would be required for the Grid Connection Agreement. A modification request to ESB/Eirgrid to connect using an alternative grid connection technology i.e overhead line is generally granted because such a modification can usually comply with the ESB Modification Request rules.

Two alternative technologies were investigated for this cable route;

- New Underground Cabling (UGC) in the public road network or
- New Overhead Line (OHL), which would be wholly off-road. The existing overhead electricity lines and telephone lines along the road, would not have the required engineering or technical specifications to carry the new line.

When the emphasis is placed on nature, the **Underground Cable in the Public Road Network alternative is better than the Overhead Line, off-road.** This is mainly due to bird strike risk (specifically hen harrier) of an overhead line and the natural lands that would be lost (particularly in the Special Protection Area (SPA)) for the pylon and pole foundations. By contrast, the underground cable would be wholly within the road pavement where there is no natural land or feeding areas for the birds and also an underground cable does not have any above ground features.

Therefore the Underground Cable in the Public Road Network option was chosen as the best technology to use.

4.3 Alternative Grid Connection UGC Route Options along the Public Road

An underground cable thus decided, alternative routes between the windfarm substation near Upperchurch and the new substation at Mountphilips, near Newport were investigated.

Most of the cabling will be within the Limerick to Thurles Regional Road (R503). Alternatives are available at the Rear Cross to Newport/Mountphilips end of the route. These were;

- The R503 as far as Rear Cross and then Local Roads, through Toor, to Mountphilips
- The R503 all the way to Newport, through Newport and then Local Roads to Mountphilips
- The R503 all the way to Newport GAA grounds east of the town, and then Local Roads through Rock-vale/New Ross to Mountphilips – thus avoiding Newport Town.

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

Therefore the R503 (avoiding Newport Town) route alternative was chosen for the cabling to the new substation at Mountphilips.

4.4 Alternative Options for Mountphilips Substation

4.4.1 Alternative Options for the Substation

A new substation is required to connect to the national electricity grid at a point along the existing Kilonan – Nenagh overhead line, in the Mountphilips area, near Newport, County Tipperary.

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

The two locations, Site A and Site B, are both in agricultural grassland fields, with Site A on the western side of the existing Overhead Line, and Site B on the eastern side.

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

When the emphasis was placed on the natural environment it was considered that an Air Insulated Switchgear Station (AIS) at Site B had the least potential to cause significant effects to the natural environment due to the much smaller size of buildings within the substation compound and the shallow depth of excavations, and therefore 'AIS at Site B' was chosen for the location and design of the Mountphilips Substation.

4.5 Alternative Process

Alternative processes were devised for Air & Human Health (Local Residents); Water and Biodiversity (Hen Harrier and Bats).

4.6 'Do-nothing' Option

The 'do-nothing' Option examines the effects caused by not proceeding with the development.

The application is for the grid connection for Upperchurch Windfarm, therefore a secondary impact of UWF Grid Connection not being constructed would be that Upperchurch Windfarm may not build and therefore;

- There will be no long term economic gain locally during the operation phase of Upperchurch Windfarm per;
    - Annual commercial rates payments of est. **€1.2 million per annum** for the lifetime of the windfarm representing a **positive contribution to the economics of the County**.
    - Annual rental payments to **36 local landowners of €700,000** annually for the lifetime of the windfarm, representing a **positive contribution to the Local Landowners**.
    - Annual **community benefit payments to local organisations of** est. **€88,000** representing a **positive contribution to the Local Community**.
    - Two teams (3 persons) of wind turbine technicians and one caretaker in full time **employment** on the windfarm, representing a **positive contribution to economics** in the wider region.
    - No improvement to **balance of payments** through the substitution of an Irish energy source (wind) for an imported energy source (fossil fuels) representing a lost opportunity cost **to economics of the Country**.

The most significant impact of a 'do-nothing' scenario is **the consequence of inaction in relation to climate change remediation**. Ireland has signed up to several Climate agreements including the "2030 Climate and Energy Policy Framework" which aims to reduce GHG emissions by 40% compared with 1990 levels by 2030. The Government White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015 – 2030' aims to transform Ireland to a low carbon economy, with a target of 70% electricity generation to come from renewable sources by 2030. The Climate Action Plan 2019 restates the 70% target of electricity from renewable sources by 2030, with on-shore wind seen as a key component of this effort.

In the 'do-nothing' alternative there will be a consequential loss of the carbon offset potential from the generation of **220 million kWh of renewable energy per annum from Upperchurch Windfarm, which will avoid the emission of 106,216 tonnes of greenhouse gases per annum** which would result from generating the same amount of electricity by gas, coal, oil or peat.

NTS of Chapter 5: Description of the Development

5.1 Location and Features of UWF Grid Connection

The UWF Grid Connection will comprise of the following:

5.1.1 Mountphilips (110kV) Substation

A new substation is proposed for a location beside the existing Killonan to Nenagh overhead electricity 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 substation will comprise a fenced compound (10290m^2 in area), 160 meters east of the existing Killonan to Nenagh overhead electricity line and two End Masts located under the existing line. The compound will contain outdoor electrical equipment and apparatus and a control building, housing electrical and metering equipment. High voltage cables will be connected to the Killonan side of the overhead line at End Mast No.1, and will be attached down the mast and then through underground ducting to the Mountphilips compound, through the electrical equipment and control building and then back onto the Nenagh overhead line through End Mast No.2. This method makes the new substation an integrated part of the National Grid.

Similar substation with End Masts connecting to an overhead line, and the substation in-between

All of the wind turbines at Upperchurch Windfarm will be connected to the windfarm substation. Upperchurch Windfarm substation will be connected to the new substation at Mountphilips, by a new 30km underground cable connecting both substations. These works will therefore allow electricity to flow from Upperchurch Windfarm, through Mountphilips Substation, to the National Grid.

5.1.1.1 Ancillary Works required for Mountphilips Substation

These works will support the construction of Mountphilips Substation and will include;

A new entrance (to Mountphilips Substation) at Coole townland; a new road from the new entrance to the substation; a temporary construction compound at the substation site; drainage systems at Mountphilips

Substation, around the temporary construction compound and along the new road; construction of one temporary and two permanent watercourse crossing structures at Mountphilips substation site; hedgerow/tree removal and hedgerow and tree replanting at the substation site entrance and along the new road; fencing at the entrance, along the new road and around the substation compound; provision of an electricity supply to Mountphilips substation and; excavation and storage of soils and reinstatement works.

5.1.2 Mountphilips - Upperchurch high voltage (110kV) underground cable

It is proposed to connect the new Mountphilips Substation to the already consented (but not constructed) Upperchurch Windfarm substation by installing underground cables between the two substations. The route of the underground cables, which is 30.5km in length, will follow a generally west/east course mostly along the Regional Road R503 (Limerick to Thurles Road). The route follows the Local Road network from the entrance off the public road for Mountphilips Substation at Coole townland, to a point on the eastern outskirts of Newport Town at Newport GAA Club on the Limerick to Thurles Road, thus avoiding Newport Town. From that point, the route follows the R503 eastwards for 22km as far as the turn-off at Knockmaroe townland, onto the Borrisoleigh Road and along the local road network and a private paved road for a short stretch (3km), to the site of the windfarm substation. This route west to east is through the townlands of Mountphilips, Coole, Freagh, Foildarrig, Oakhampton, Rockvale, Mackney (O'Brien), Mackney (Bourke), Ahane, Newross, Castlewaller, Carrowkeale, Tullow, Cooldrisla, Derryleigh, Kilnacappagh, Scraggeen, Derrygareen, Inchadrinagh, Knockancullenagh, Fanit, Lackamore, Tooreenbrien Upper, Tooreenbrien Lower, Reardnogy Beg, Reardnogy More, Shanballyedmond, Baurnadomeeny, Coonmore, Foildarragh, Kilcommon, Loughbrack, Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons.

The cable will be installed underground in trenches, which will be laid with ducts (pipes) through which the electrical cables and communications cables will be pulled. The cable lengths will be pulled through and joined together at forty-two Joint Bay locations at intervals along the roads. The ducts will be surrounded by bedding sand and concrete and the trench will be backfilled. When the trench is finished, the only sign above ground of the cable, will be the man-hole type covers over the Joint Bays, and the location marker posts.

Example of underground cable trench on the Public Road

5.1.2.1 Works and Activities for the Underground Cable

- Traffic management around the trenching works along the public road network, will be managed along most of the route with one-lane closures. However, due to the narrow nature of the Local Roads along the route, the Local Roads at Oakhampton, Carrowkeale and Knockmaroe will need to be closed for between c.1 – 3 weeks. Local Access to homes and farms/businesses 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 also be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.
- The excavated material from the underground cable trenches in the public road will be classed as spoil and will be removed to a licensed waste facility
- Along the underground cable route on the public road, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and road condition 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.
- There will be **sixty-three water crossings along the public road** between the Mountphilips Substation site and the turn off for the Consented UWF Substation site. There are **two water crossings** on the private paved road at 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, comprising **fifteen bridges and fifty culverts** (both box culverts and pipe culverts). Culverts are funnels carrying a stream or open drain under a road.
- There are public water pipes under most of the roads to be used for the underground cabling. Before construction, Irish Water will be consulted and confirmatory surveys would be carried out ahead of works. Where possible the mains pipes will be avoided. If the pipes cannot be avoided, then the pipes will need to be moved to a point in the road as near as possible to the current position. This will be done in full consultation with Irish Water. In addition, the pipes will be protected from damage by the presence of a supervisory banksman during excavation works.

5.1.3 Project Design Features and Measures which will protect the Environment

At the start, when UWF Grid Connection was being designed, the Project Design Team focused on the potential or likely significant effects of the proposed development, on the environment where it is to be located. These potential or likely effects were then **avoided or reduced**, by developing and integrating measures (called **Project Design Environmental Protection Measures**) into the fundamental design of the development. There are **sixty-nine** of these measures. The Project Design Environmental Protection Measures are as much part of the project as the trenching or watercourse crossing measures. The Project that is examined and evaluated in the EIA Report includes these measures, not as a desirable addition, but as an **integral part of the Project.**

5.2 UWF Grid Connection: Construction and Operation

5.2.1 UWF Grid Connection Construction Phase

All elements of the whole Upperchurch Windfarm (UWF) Project will be constructed at the same time. Construction of UWF is expected to commence in 2020/2021 and will take approx. 12 months. Approximately 100 workers will be engaged in the pre-construction, main construction, cable jointing and commissioning works for the UWF Grid Connection.

- 1360 loads of concrete; 1350 loads of aggregate; and 210 loads of surface dressing (public road sections) will be imported from Roadstone Killough and Shanballyedmond, Rear Cross, Co Tipperary and Bunratty, Co Clare.
- 13 loads of general building materials including geotextile, and 313 loads of electrical plant and equipment including lattice towers, control building doors and switching gear, will be imported to the site from various suppliers throughout Ireland and the EU.

See Figure NTS 3: Haul Route for Stone & Concrete Deliveries for the stone/gravel and concrete deliveries. The other construction equipment will be transported along the roads to the cable work sites.

5.2.2 UWF Grid Connection Operational Phase

Once commissioned and energised, the Grid Connection will be taken in charge by ESB Networks and the Mountphilips Substation and the Mountphilips – Upperchurch underground cable will become part of the national electricity network and 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.

Very infrequent planned maintenance or unplanned repairs may be required, if at all, during the lifetime of the UWF Grid Connection, it is expected that one crew with c.6 ESB Networks personnel would be required for 1 week – 2 weeks, 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 therefore decommissioning and dismantling the works is not expected.

5.3 UWF Grid Connection use of Natural Resources, Emissions and Waste

5.3.1 Use of Natural Resources during the Construction Phase

There will be **4.8 hectares of agricultural land** required for the construction works site. The remaining construction works areas is 24.2 hectares of public road, which are not classified as a natural resource**. No forestry** will be felled.

160m of hedgerow/earthen bank and 29 No. trees of varying maturity will be permanently removed, at the Mountphilips Substation entrance from the public road. These hedgerows and trees will be replaced as near as possible to the original location behind the entrance sightlines. Also, **additional new hedgerow 700m long will be planted** with locally sourced native species, on the permanent berm to be created alongside the new road that will run between the public road entrance and Mountphilips Substation compound.

Water required for toilet and washing facilities, will be brought onto site.

Approximately 4,060m^3 of **topsoil**, 1,200m^3 of **subsoil** and 30m^3 of **rock** will be excavated from the works areas.

5.3.2 Use of Natural Resources during the Operation Phase

The **land** required will reduce considerably to just **1.75ha of land permanently changing use** - comprising the footprint of the Mountphilips Substation. The agricultural lands will be reseeded with grass and returned to agricultural grassland use.

No further **hedgerow** or **tree pruning or removal** will be required during the operational stage.

Water requirements for toilet and washing facilities 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 will result in very small volumes of surface dressing, crushed stone and sand being temporarily removed from the area directly over the joint bay covers, stored adjacent to the Joint Bay, and re-used to reinstate the top of the Joint Bay following the completion of the repairs and the finishing layer will be surface dressed.

5.3.3 UWF Grid Connection: Emissions

Dust, construction machinery exhaust, noise, vibration and light will be emitted during the **construction stage at insignificant levels**. Negligible levels of these are also associated with the operation and maintenance activities. During operation, Mountphilips Substation will emit **noise** however this is unlikely to be audible above the existing background noise levels at nearest residence, which is 385m distant. The operational sub-station and underground cable will be a source of very low frequency **electromagnetic fields.** These fields will be **at a level substantially less than national and international guideline limits and background levels at local houses and community facilities will remain the same as what is there already**.

5.3.4 UWF Grid Connection: Waste

Waste water from construction stage toilet and washing facilities will be contained in self-contained units and emptied by a licenced facility. During construction, general and chemical waste will be segregated and

stored in allocated tanks, bins, skips or areas at the Temporary Compounds. 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**.

c.2,740 m^3 of bitumen bound surface dressing and c.1,830 m^3 base layer aggregates, c.16,450m^3 of subsoil and c.2360m^3 of rock will be excavated from the **public road** for the underground cable trenches and joint bay locations. All of this material –the **bitumen, aggregate, subsoil and rock, will be classed as spoil**, and will be removed to a licensed waste facility. The material excavated with 15m of invasive species infestations along the public road, will be identified and removed to an appropriate licenced facility.

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

5.4 Vulnerability to Major Accidents & Natural Disasters

UWF Grid Connection **is not vulnerable to Major Accidents or Disasters**, due to the minimal volumes of the Dangerous Substances which will be used during construction and operation.

Given the stable nature of soils at Mountphilips Substation and the location of the vast majority of the underground cable route along the carriageway of public roads, it is **Extremely Unlikely** that a **land slippage** event will occur.

It is Extremely Unlikely that the development will cause a flooding disaster because of the distributed nature of the works over a large geographical area, the fact that all permanent hardstanding will have runoff control measures and all permanent culverts will be sized for peak flood flows.

5.5 Other Projects and Activities Considered in the EIA Report

5.5.1 Off-Site Project - The Whole UWF Project

UWF Grid Connection is part of a whole project which comprises the following other elements – **UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm (UWF) and UWF Other Activities.**

5.5.2 Other Projects or Activities

Other Projects or Activities in the area that might be built within a specific area or at the same time as the Whole UWF Project and which might have significant interaction effects, were identified.

Other Projects include electricity and communications infrastructure; other built or consented windfarms; existing and proposed quarries; consented public park development; camp site proposal.

Other Activities include agriculture; forestry and turf cutting activity in the vicinity.

These Other Projects and Activities are included in the in-combination assessment of the development.

NTS of Chapter 6: Population

The study in Chapter 6: Population examines the effect of the proposed UWF Grid Connection on the **economic activity of people living, working and visiting** in the area, which is between Thurles and Limerick and includes Newport Town and the villages of Rear Cross, Upperchurch and Hollyford in County Tipperary, and the town of Cappamore and the village of Murroe in County Limerick. Along the underground cable route, residents are concentrated in Newport town and Rear Cross village.

6.1 How the Population study was carried out

The study on Population was carried out by John Lawler and Ciara Morley of EY-DKM Economic Consultants.

The effects on the **Local Economy** were evaluated. The Local Economy area studied is the Electoral Districts in which the new substation and underground cable are located, along with adjacent Electoral Districts which contain towns and villages, important to the area.

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.

6.2 The make-up of the population and economic activity of the area

UWF Grid Connection is proposed for the **rural uplands between Thurles and Limerick**. With the exception of Newport Town, the area is typical of a rural upland area in Ireland and is sparsely populated, with people living in farmsteads and once-off houses throughout the area, and in the small population centres. There are relatively few services in the area, concentrated mainly in local towns and villages typically comprising local shops, pubs and schools.

A significant proportion of the **local workforce commutes to work**, and the key employment sectors in the area are Commerce & Trade and Professional Services, so it is likely that they are accessing employment in the nearby urban areas, notably **Limerick, Thurles and Nenagh**.

Agriculture and forestry are important sectors within the area, accounting for almost **10% of business premises** and **8% of the workforce** (higher than the State average of 4%). **Walking and hiking are the main tourism offerings** to visitors to the area. Outside of Newport town, there are **low numbers (12 places) of visitor accommodation and food services** in the hinterland.

6.3 What possible effects on Population were studied?

Possible positive effects to the Local Economy that were considered, were increase in local spending due to the purchase of goods, materials and services, employment; and the payments to landowners involved during the construction phase.

Possible negative effects to the Local Economy that were considered for the construction phase, were business disruption due to the presence of roadworks and effects on tourism due to reduction in rural tranquillity from construction works.

6.3.1 The effects of UWF Grid Connection on the Local Economy

Gross Value Added to Business (local spend) & Employment Opportunities:

The **construction of UWF Grid Connection will have a Neutral Positive** effect because it will increase value to business and create employment opportunities in the area due to the purchase of goods, materials and services, employment and payments to landowners, which will have a knock-on effect of increased spending in the local economy. The effect will be through:

- 100 people working directly on building the grid connection which includes the substation and the underground cable, over the course of the construction phase,
- c.€1.5 million to be spent on stone & concrete from Rear Cross Quarry and Roadstone (Bunratty & Holycross),
- c.€900,000 to local landowners, in the form of wayleave agreements and land purchases,
- c.€500,000 spent on locally sourced goods and services.

This effect will be positive but **Neutral** overall, because the additional monies and activity generated locally of c. **2.9 million euro**, is only equivalent to approximately **1% of the overall size of the Local Economy in the area**. This will be a temporary effect during construction.

6.3.2 Other Matters evaluated as having Neutral Effect

Effects will be so small on **business disruption** during the construction phase and a reduction **in tourism revenue** during the construction and operation phase that they will be **Neutral**. Also, there will be **neutral effects** in terms of **local spend and employment opportunities** during the **operational phase**.

6.3.3 The cumulative effects

When the effects of UWF Grid Connection on the Local Economy are considered in-combination (cumulative) with the effects of the other parts of the Upperchurch Windfarm Project and with Bunkimalta Windfarm and Castlewaller Windfarm, the summary result is that **the cumulative effects of development spending during construction will be positive, but Imperceptible** (imperceptible is an effect capable of measurement, but without significant consequences).

6.3.4 Best Practice

Best Practice Measures will be implemented during construction relating to local sourcing of goods, services and labour, and will include the provision of a full time Community Liaison Officer, so that businesses will be informed of the materials and services required. Measures built into the project for road safety and timing of the construction works, particularly where the works overlap with works for other parts of the Upperchurch Windfarm Project, will also indirectly protect the Local Economy.

6.4 Conclusion

The experts who examined this topic concluded that **no significant adverse effects on Population** (specifically to the Local Economy), will occur as a result of the UWF Grid Connection on its own, or in-combination with the other parts of the whole Upperchurch Windfarm Project or other windfarms to be constructed.

NTS of Chapter 7: Human Health

The study in Chapter 7: Human Health evaluates the effects on human health in the area.

Health is determined not only by access to quality healthcare services and lifestyle choices but also by the social and economic conditions in which people live.

7.1 How the Human Health study was carried out

The study was carried out by Dr. Andrew Buroni and Tara Barrett of RPS Group's Health and Social Impact Assessment team.

The effects on **Local Residents and Community** – i.e. the people who live and work in the development area; and **Transient People** i.e. people passing through, whether agricultural and farm workers and tourists and recreational users such as walkers and cyclists, were studied.

The Human Health chapter investigates and assesses the likelihood of significant effects directly attributable to the development and draws from and builds upon, the conclusions of the other chapters most notably Chapter 6: Population, Chapter 11: Water, Chapter 12: Air, Chapter 14: Material Assets - Built Services and Chapter 15: Material Assets - Roads. A positive or negative impact to these topics, could in turn impact on human health.

The chapter is also informed by Human Health related guidelines and publications on electromagnetic fields from power lines and on air pollution from construction activities.

7.2 The current status of Human Health in the area

People living in the area are assumed to be marginally more sensitive to health effects than the average population in Ireland in the context of the Census of Population 2016, which has indicated that the **proportion of elderly and young people resident in the area is slightly higher than the national average**, thereby making them more sensitive to health effects.

7.3 What possible effects on Human Health were studied?

The health of local residents and community could be indirectly positively impacted by an increase in employment during construction**.**

The health of local residents and community and people passing through either working or at leisure, could be indirectly negatively affected if there were construction or operational effects on water sources; or increases in airborne dust and noise; or a reduction in road safety; or increases in electromagnetic fields. The results of the studies of these effects in other topic chapters, is used to access the effects on health.

Protective measures were developed for road safety; noise and air quality; local water supplies; water quality at watercrossings; and the control of refuelling of vehicles and of fuel and chemical stocks, to protect water supplies and local streams and rivers. The full list of Environmental Protection Measures are listed in Volume D: UWF Grid Connection Environmental Management Plan.

7.3.1 The effects of UWF Grid Connection

7.3.1.1 Local Residents & Community

Increased employment:

Increased employment during construction will have a Slight positive effect on human health, because employment, although temporary, is considered good for your health.

7.3.1.2 Transient People

No negative or positive effects are likely to occur to people working or passing through the area.

7.3.2 Other matters evaluated as 'Not likely' or having 'No Effect'

Negative effects to the health of local residents or members of the community due to the construction or operation of the development are evaluated as 'Not Likely' or 'Neutral'. This is because;

- **Contamination** of local wells and springs or piped water supply is **not likely to occur**;
- The existing background levels of air pollutants in the development area are significantly below EU limits. **Any dust from construction works** will be temporary, infrequent and **not enough to cause negative health effects**. In any case, the majority of residential properties and community facilities (including schools) are greater than 50m away from construction works or construction haul routes;
- **Any noise generated during the construction phase will not cause annoyance or sleep disturbance** when considered in the context of the very short duration of works within close proximity to any property, and the carrying out of works during daylight hours between 7am and 7pm. No construction will be carried out within 150m of Lackamore National School and Rear Cross National School during school opening hours;
- **Noise from the operational Mountphilips Substation will not be audible** above the existing ambient noise levels **at the nearest houses**;
- Most of the roads being used are very lightly trafficked and the **construction traffic will not add substantial volumes of traffic**. In addition, road safety measures have been designed into the UWF Grid Connection project through the use of appropriate advance warning signage and traffic management measures (such as scheduling of deliveries past local schools to take place outside of school drop-off/pick-up times).
- **Electromagnetic Fields (EMP)** are emitted from all electrical equipment. Because the area is rural and away for significant power infrastructure and industrial development the area experiences very low levels of EMF already, coming from overhead electricity lines, electrical appliances and wiring in the home and farm/business. The nearest residential property is 385m distance from Mountphilips Substation and therefore there will no increase in ambient EMF levels from the operating substation, at this house. There will be a very small increase in EMF levels at the 317 local residences and 17 community facilities (including 2 schools) which will be within 100m of the operating underground cabling. The worst case increase in levels will range from 4.45µT to 0.01µT for residences/community/businesses between 5m and 100m from the operating underground cable. These levels remain significantly below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) **magnetic field reference limit of 100µT**. People passing through the area (walkers or farm and forestry workers) could pass either over or beside the new electrical infrastructure (particularly the underground cable) but they will not be in close proximity for any extended period of time. Even so, the levels predicted in close proximity are half of the ICNIRP limits.

7.3.3 The cumulative effects

When the effects of UWF Grid Connection on Increased Employment during construction, are considered with the effects of UWF Related Works, Upperchurch Windfarm and Bunkimalta Windfarm - the summary result **is that the cumulative effects will be positive but Imperceptible and therefore not significant**.

7.4 Conclusion

The experts who examined this topic concluded that **no significant effects on Human Health** (**either positive or negative)** will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project, or cumulatively with other projects.

NTS of Chapter 8: Biodiversity (plants & animals)

The study in Chapter 8: Biodiversity relates to natural areas, rivers and their fish, and animal and bird life in the area, and how the development will affect them.

8.1 How was the Biodiversity Study Carried Out

The study on Biodiversity, was carried out by Howard Williams and Chris Cullen and their team of ecologists in Inis Environmental Consultants.

The effects on **European Sites; National Sites**, **Aquatic (water) Habitats and Species**, **Terrestrial (land) Habitats**, the **Hen Harrier** bird, **General Bird Species**, **Bats**, **Non-Volant (not flying – i.e. land based) Mammals; Amphibians & Reptiles** and the **Marsh Fritillary** butterfly were studied.

Sources of information on the biodiversity in the area - i.e. nature, or the plants and animals in the area, came from **Consultations** locally and nationally with specialist bodies including **National Parks and Wildlife Service (NPWS)** and **Inland Fisheries Ireland (IFI)** and with the other experts on the EIA Report team in particular **Soil, Water** and **Air** experts. **Guidelines** and **Publications** that were used extensively included; guidelines for evaluation of effects on biodiversity in an EIA Report, surveying techniques and protection measures for watercourses, plants and animals (including badgers, otters and bats) from the **National Roads Authority** and other national and international bodies; national and international publications on specific aspects of biodiversity and their protection; **Scottish Natural Heritage** recommendations for bird survey methods; publications on hen harrier behaviour and population numbers; publications on the current status, surveying methods and guidelines on protection measures for birds, habitats, bats, badgers, Otters, Aquatic Habitat and Species and Invasive Species; the **Heritage Council** guide to the Habitats of Ireland; **IFI guidelines** for construction works; the EC **Water Framework Directive**; national and international guidance on controlling pollution; **NPWS, National Biodiversity Data Centre, Transport Infrastructure Ireland, European Union, The Heritage Council, Environmental Protection Agency, IFI, Irish Wildlife Trust, Birdwatch Ireland, Bat Conservation Ireland, Butterfly Ireland** websites; **Tipperary County Development Plan** including strategies and action plans for **Biodiversity, Heritage, Renewable Energy**; **planning documents** and survey results relating to a) the Other Elements of the Whole Upperchurch Windfarm Project and b) other relevant projects and activities.

8.1.1 Summary of Fieldwork Surveys Carried Out

The following is a list of surveys conducted relevant to Biodiversity Chapter;

Terrestrial (land) and Aquatic (river) Habitats

All land habitats present within 50m of the construction works area for Mountphilips Substation and the underground cable were examined during field visits in January and May 2019. A watercourse characteristics survey of the 68 watercrossing locations of underground cabling (by the authors of the Biodiversity and Water Chapters) was carried out over four days in January 2019.

Hen Harrier

- Existing records of Hen Harrier usage of the area, dating back to 2003 and extending to 2018, were gathered together to establish historical nesting or roosting sites. In January 2019, consultation took place with local Hen Harrier experts and the NPWS. Hen Harrier surveys were performed during the 2019 breeding season, in April, June and July 2019.
- In order to determine the availability of nesting and foraging habitats for Hen Harriers within 2km of each identified nest location from the April 2019 survey, satellite imagery was examined and any

suitable habitat identified on the satellite was checked out on the ground, during field surveys carried out in May 2019.

- Habitat and birds and animal surveys (that the Hen Harrier might like to hunt) within 150m of the construction works boundary, were also carried out in May 2019.
- Winter Roost Surveys were undertaken for the 2018 planning application in Sept 2016 to Feb 2017 and Sept 2017 to Feb 2018 and these surveys, along with the 2019 breeding season surveys, up to date information from local Hen Harrier experts and the NPWS, were sufficient to inform this 2019 application.
- Hen Harrier Activity Surveys performed from March 2015 to April 2017, were used as a source of information particularly for the Whole UWF Project cumulative effect - these surveys focused on suitable nesting habitat and historical nest locations, within 2km of the UWF Related Works/Upperchurch Windfarm site.

General Birds

A bird survey was undertaken at the Mountphilips Substation site in the breeding season of 2016 and 2017 and non-breading seasons of 2016/ 2017 and 2017/2018 and a similar survey was carried out in April 2019, for the whole length of the underground cable route for the breeding season of 2019. Kingfisher: Watercourse crossings were evaluated for any evidence of Kingfisher nest holes within 300m of crossing locations (at the same time as the Otter surveys in January and May 2019). Specific, Kingfisher surveys were undertaken in June 2019 at selected locations with potential to support suitable Kingfisher foraging and nesting site, and with potential for greater availability of food. Barn Owls: In February 2019, buildings were noted for potential suitability for Breeding Barn Owls. In July 2019, buildings identified as having high suitability for Barn Owls were surveyed.

Bats

Bat surveys were conducted in January 2019. 69 buildings within 50m of the underground cable route were surveyed (there are no buildings within 50m of Mountphilips Substation). Mature trees within 50m of the UWF Grid Connection construction works area were inspected from ground level. As the underground cable will be installed over/under c. 65 watercourse crossing structures (i.e. bridges and culverts), all structures along the route were inspected. Presence / absence bat surveys and/or roost characterisation surveys were carried out at 11 bridges (deemed suitable) along the cabling route. Bat Activity Surveys using automated detectors were carried out at four locations near the Mountphilips Substation site and two locations near the consented Upperchurch Windfarm substation in the mid-summer and autumn seasons of 2016 and these results informed the current application.

Non-Volant Mammals (non-flying)

The surveys of non-volant mammals, to inform the 2018 planning application (partially relied on here) were undertaken in March, 2016, August 2016, September 2016, and April 2017. Updated surveys of non-volant mammals (including badger in particular) present within 50m of the proposed works (for this the 2019 Grid Route) were completed in January and May 2019. Otter: surveys of suitable watercourses were also carried out in January and May 2019 where a total of 20 watercourses were surveyed, 300m upstream and downstream of the proposed works.

Amphibians (i.e frogs, newts etc) & Reptiles (common lizard)

Amphibians and reptiles occurring within the study area were recorded during the course of all site walkovers for habitat, mammal and bird surveys and in May 2019 the section of route bypassing Newport town, where there is suitable habitat for Smooth Newt and Viviparous Lizard was particularly examined.

All of these surveys formed the basis of identification of the biodiversity, or plants and animal life, in the area.

8.2 The make-up of Biodiversity in the Area

European Sites (comprising the Natura 2000 network) are designated sites of International Importance. The findings of the effects of the development on European Sites relevant to the development, are fully considered and evaluated in the Natura Impact Statement (NIS) submitted with this application. The findings of the NIS are summarised in the European Sites section of the Biodiversity Chapter.

The effects on four European Sites were studied in the NIS - 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 Mitigation measures (Project Design Measures, Best Practice Measures, Surface Water Management Plan, Invasive Species Management Plan and the Traffic Management Plan) prepared specifically for this project are considered to be robust and proven measures, which will avoid significant adverse effects to European Sites. In summary the **NIS concludes 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.

National Sites are Irish designated sites of ecological importance and are made up of Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHA). The development will not be within any National Site. There are three NHAs and twenty-three pNHAs within 15km of the UWF Grid Connection. The nearest site is Bleanbeg Bog NHA which is 2.2km north of the development.

Aquatic Habitats & Species: Aquatic habitat are the features of rivers and streams like the river/stream bed, the shape of the river/stream (ripple pools, waterfalls etc.) and the quality of the water (clean or polluted). These features support the rivers and river banks that provide feeding and shelter for fish and other water species. Watercourses and their species are highly sensitive to change.

Sixty-eight watercourse crossings occur within the construction works area boundary. The majority (63 water crossings) of which are located in the Lower Shannon & Mulkear River area of the River Shannon catchment, with just five watercourses located in the River Suir catchment. The majority of these watercourses are minor streams and land drains, which have been subject to previous man-made changes such as drainage, abstraction of water for cattle troughs and diversions of the watercourse. This has resulted in the reduction of ecological status and fisheries potential in the majority of cases throughout the catchments. Instream works are required at two watercourses only with fisheries value, and a culvert replacement is likely to be required at one watercourse with fisheries value.

Terrestrial (land) Habitats in the area is made up of agricultural grassland, commercial forestry, woodland, peatlands, hedgerows, wet grassland, private roads and public roads. The Mountphilips substation is proposed for a grass field. Outside of the substation site, the underground cable part of the development is wholly along the public roads within an agricultural setting, and for the most part the landscape around the road is dominated by agricultural grassland with roadside hedgerows, treelines and earth banks, with numerous dwellings, farm buildings and associated gardens, hedges and lawns.

Hen Harrier bird: The Mountphilips Substation site is located to the west of the Slieve Felim & Silvermine Mountains upland area and will be connected by an underground cable to Upperchurch Windfarm Substation to the east of the upland area. Most of the cable route is along the Thurles to Limerick regional road. This part of the road passes through the Slievefelim to Silvermines Mountain Special Protection Area

(SPA), which is a European Site designated of special conservation interest for the Hen Harrier bird. The Mountphilips Substation is not located within the SPA; however 8km in length of the underground cable passes through the SPA, entirely along the Thurles to Limerick Road.

Nearest Nests: There are seven traditional nesting territories within 2km of the proposed development - with a further three traditional territories within 3km. Seven of these ten territories were confirmed as active during the 2019 breeding season.

For the period between 2016 and 2019, nine nests were recorded within 2km of the proposed development, with a further three nests within 3km, and one nest at 3.2km (13 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). The closest identified nest to the proposed development in any year was 600m away (2016), with the closest active nest in 2019 being 900m away. No nests were recorded within 2km of the Mountphilips Substation, with the nearest nest being 4.6km from Mountphilips (in 2016).

One-third 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 underground cabling locations, at closer distances to the underground cable the habitats are less attractive at least to nesting Hen Harriers - within 50m of the proposed works for example, only 1/10th of all habitats are identified as suitable nesting habitat. This undoubtedly is because of the location of the underground cabling on public road.

Nearest feeding grounds (suitable habitat): Hen Harriers primarily forage (hunt for food) within 2km of the nest. The area of land suitable for foraging Hen Harrier within 2km of all nests comprise just less than half of the total lands within 2km of all identified Hen Harrier nests, which is enough suitable foraging habitat for an area to be attractive to Hen Harrier. There are also hedgerows present, which may offer foraging opportunities.

Winter Roosting: No communal roost was identified within 2km of the development during 2016-2018 surveys and consultations with the National Parks and Wildlife Ranger. One roost exists at 2.1km from the development, and there are two other roosts between 3km and 3.6km.

General Birds: The birds recorded during the surveys at the Mountphilips substation site and the survey along the entire length of the proposed underground cable route are all representative of common and widespread breeding bird communities in Ireland, being typical of the surrounding landscape. The general wintering bird community is typical of common and widespread bird communities found in the wider countryside in Ireland. During the surveys two bird species that are Red-listed as Birds of High Conservation Concern in Ireland were recorded: Grey Wagtail (11 sightings) and Meadow Pipit (98 sightings). Sixteen Amber-listed birds were recorded. No birds listed on Annex I of the EU Birds Directive was recorded and no Barn Owl was recorded.

Bats: **Thirty eight buildings** were found to have high or moderate roost suitability, and were considered for potential indirect effects (there is no potential for direct effects because no works or damage to buildings will occur). **Two trees at Mountphilips substation** were considered to have moderate suitability for bats (e.g. multiple or larger crevices that could support multiple roosting bats). **Along the cabling on the public road network, no trees** was considered to have moderate suitability for bats. **Eleven bridges** had moderate suitability for roosting bats. Bat roosts were recorded in two bridges but these were considered to be day

roosts / satellite roosts, which would be of negligible ecological value. Bat activity levels (from six sampling locations) were relatively high, with an average of one bat pass every 2 - 3 minutes throughout the survey period. The most frequently-recorded species were common pipistrelles, followed by soprano pipistrelles, Myotis spp. and Leisler's bat, in order of abundance. Lesser-horseshoe bats were not recorded. One of the sampling sites was considered to be of County Importance as a feeding area / commuting route, four to be of Local Important, and one of Negligible Importance.

Other Mammals (non-volant i.e. non-flying): Watercourse crossing locations plus 300m in either direction was searched for signs of Otter and the construction works area plus 50m in all directions was searched for signs of Badger and all other Mammals. Surveys recorded evidence of Otter, Badger, Fox, Deer, Rat and Squirrel, 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 area surveyed. At the Mountphilips Substation site evidence of Badger, Squirrel, Deer and Fox were recorded.

Amphibians & Reptiles: The construction works area plus 50m in all directions was searched for signs of the common frog, smooth newt and viviparous or common lizard because suitable habitat occurs throughout the area. None were found but it is assumed that in locations where suitable habitat exists, these species are likely to occur.

Marsh Fritillary: No suitable habitat was recorded on or adjacent to the lands at Mountphilips Substation site. Outside of the Mountphilips Substation site, the underground cable is located entirely in the paved surfaces of roads which are not suitable habitat for Marsh Fritillary butterfly.

8.3 What possible effects on Biodiversity were studied?

European designated SACs (Scientific Areas of Conservation) like the Lower River Shannon SAC, Clare Glen SAC and the Lower River Suir SAC in this case, were studied for effects to water quality. Animals and birds in both SACs and SPAs (Special Protection Areas), in this case the Slievefelim to Silvermines Mountain SPA (specially designated for the Hen Harrier bird), were studied for disturbance, displacement, habitat loss or accidental death. These designated sites are also studied for encroachment by invasive plant and animal species.

River habitats and fish were studied for effects on water quality from pollution or by an increase in sedimentation i.e. runoff from excavations, by changes to the flow of the river or by the spread of invasive water species. **Land and habitats** were studied for any effects or changes by drainage; by pollution; by encroachment by invasive plants or by natural land being converted to hard paved surfaces.

All animals, birds, bats and fish were studied for disturbance of their breeding/nesting/foraging places by construction and maintenance works; loss or changes to their breeding/nesting/ foraging habitat due to permanent or temporary features of the works; new buildings or works breaking up an animal or bird's continuous area for foraging or mating into separate unconnected areas; and accidental death caused by construction works and machinery.

8.3.1 Measures to avoid, prevent or reduce negative Effects on Biodiversity

The following is a summary of the **Project Design Environmental Protection Measures**, which are built into the **Design** of the proposed UWF Grid Connection project, in order to prevent or reduce negative effects on Biodiversity;

- Field surveys will be carried out to find any active Otter holts prior to construction. Measures to prevent disturbance and injury to any otters present, will be put in place.
- There will be protective measures to avoid damage to existing tree roots during the construction phase.
- Pre-construction surveys for the presence of hen harrier bird nests and winter roosts, will be carried out. Works will only take place at Mountphilips Substation site, within 2 km of any identified active nest, outside of the breeding season (Sept-Feb). Works on the underground cable along the roads, will only take place outside of the breeding season.
- Hedgerow removal and clearance of any other breeding bird vegetation will only take place outside of the bird breeding season.
- Nest boxes will be provided for both Dipper and Grey Wagtail at bridges that are found to be suitable for these birds. Works will not take place at any bridge during the Dipper breeding season (Feb-June inclusive) without a survey to establish if Dipper are present. In any case, works at bridges will be overseen by a project ecologist. Where works will be carried out at parapet walls of bridges, no works will take place between the period April-August without a confirmatory survey as to the presence or absence of breeding Grey Wagtail. Also, all bridges/structures where works are proposed will be surveyed for general breeding birds, prior to works commencing.
- All construction works will be carried out during daylight hours and this will prevent disturbance to animals active at night. Although security lighting will be used at the temporary compound at Mountphilips Substation, it will be hooded in order to prevent light spill and will be controlled by motion and time sensors to minimise the amount of time the lights are turned on.
- Confirmatory surveys will be carried out at all trees with bat suitability that will require felling or removal of branches. It is not expected that any trees with moderate or high suitability will be felled, however any felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November and robust, weather-proof bat-boxes, will be placed in each of the affected sections to compensate for the loss of potential tree roosts. All bridges of moderate suitability for bats will be resurveyed prior to the commencement of construction works. If a bat roost is found, the project ecologist will review the proposed works at that bridge, and determine whether there could be a risk of impacts on the roost and devise a plan of action.
- Confirmatory surveys will be carried out, within 50 m of either side of the construction works area boundary, of identified badger setts to determine if any setts have been established. NWPS will be notified if an active sett is located within 50 meters of the development. If sett exclusion is required, this will be undertaken by an experienced ecologist under the necessary license and following best practice guidance (NRA, 2005). No construction works will be carried within 50m of an active badger sett during the main breeding season (December to June). Construction activity in the environs of a known active badger sett outside of the breeding period will follow NRA (2005) guidelines.
- Clearance of temporary brash piles immediately after any hedgerow or tree removals will be carried out, so that amphibians and reptiles will not use them for refuge in the first place and then risk disturbance when the brash is cleared.
- Identified sites of invasive species such as Rhododendron, Japanese Knotweed, Himalayan Knotweed and Giant Hogweed along the road, will be fully covered with high density polyethylene grass carpet terram, prior to the works commencing and will not be disturbed during these works. This covering will be supervised by an ecologist with prior experience of this type of work.

Note: Project Design Environmental Protection Measures to prevent contamination of groundwater and surface water **which could indirectly affect biodiversity** are listed in the Non-Technical Summary for Water (see Section 11 below).

8.3.2 The Effects of UWF Grid Connection

The definitions used to describe the significance (or importance) of effects are explained in the following table;

Table 1: Significance of Effects (Environmental Protection Agency - EPA, August 2017)

Significance of Effect	Description
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends

Note: *All effects are assumed negative unless stated otherwise.*

Neutral is defined as: 'No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error'.

8.3.2.1 European Sites

The potential for effects on European Sites of the UWF Grid Connection and the Other Elements of the Whole Upperchurch Windfarm Project **is evaluated in the Natura Impact Statement** (included as Volume E of the Planning Application).

In summary, there are 23 European protected sites within 15km of the construction works boundaries, afforestation lands and activity locations associated with all of the Elements of the Whole Upperchurch Windfarm Project, and it was evaluated that there is potential for significant effects to four sites; Lower River Shannon SAC, Lower River Suir SAC, Clare Glen SAC and the Slievefelim to Silvermines Mountains SPA. In summary, potentially significant effects have been evaluated and it can be concluded on a reasoned basis**, that the proposed development will not result in adverse effects on the Integrity of the European Sites** which were under consideration.

8.3.2.2 National Sites

There are three Natural Heritage Areas (NHAs) and twenty-three proposed NHAs (pNHA's) within 15km of the UWF Grid Connection. It is evaluated that there is **no potential for effects to the three NHAs or their Features of Interest because the development will not overlap any NHA boundary** and because the development is located **downslope of the NHAs**. The development does not overlap any pNHA either and therefore there will be no potential for effects either.

8.3.2.3 Aquatic (water) habitats and species

Decrease in the instream habitat quality*: Slight to Moderate* impact because instream works (at the three locations where there is no existing bridge or culvert) will only be carried out in the period between July and September (because these rivers/streams have fisheries values) when water flows are likely to be low. All the other crossings will be at existing culverts or bridges and the cabling will be put under the existing road. Most of the watercourse to be crossed, have either Low or No fisheries values. There are protection measures for watercourses built into the design of the project and the contractor will be obligated to implement these measures.

Change to Flow in the Watercourse due to instream works for the two new watercrossings and one culvert replacement at a watercourse with fisheries values. Instream works will also be required for any replacements of existing culverts. The impact will be *Slight* because as stated previously, instream works (at the three locations where there is no existing bridge or culvert) will only be carried out in the period between July and September (because these rivers/streams have fisheries values) when water flows are likely to be low. The shape of these rivers/streams have been some way altered already for agriculture, forestry and public road use. Any new culverts will be sensitively designed in accordance with Inland Fisheries Ireland (IFI) guidance and there are protection measures built into the design of the project to protect the shape of the watercourses where works are required.

Disturbance or Displacement of Fish: The impact will be *Slight* because of the timing of the works during July – September at the three watercourses with fisheries values; the brief to temporary length of time required for the works; any effects can be reversed and the implementation of water quality protection measures which will lessen/avoid sediment laden runoff from entering watercourses.

Riparian habitat (river/stream banks) degradation: The effects will be *Slight* to *Moderate* for the same reason as for Decrease in the instream habitat quality.

Spread of Aquatic Invasive Species: *No Likely Impact* because of the implementation of the Invasive Species Management Plan and adherence to best practice Biosecurity Protocols as set out by IFI in 2010.

8.3.2.4 Terrestrial (land) habitats:

Reduction in Terrestrial Habitats: *Imperceptible* because most of the works are within paved roads; the low sensitivity of the land to be changed for Mountphilips Substation and the limited amount of land required. The change will be permanent.

Hedgerow Severance: Limited to the Mountphilips Substation site where existing field boundaries will be removed mainly to provide sightlines for the entrance from the public road. A new longer hedgerow will be sown behind the sightlines and along the new road across the fields to the substation. The effect will be *Imperceptible* because all hedgerow being removed will be replanted like for like with semi-mature native trees and plants, and the end result will be more hedgerow. It will therefore be a temporary effect while the new hedgerow is growing.

Loss of High Nature Value Trees: Tree loss is limited to the Mountphilips Substation site, where 1 mature Ash and 17 immature trees will be felled mainly for the entrance and 11 immature trees will be felled along the new permanent access road. The effect is evaluated as *Imperceptible* because of limited numbers of trees lost and replanting of trees elsewhere in the scheme.

8.3.2.5 Hen Harrier

Reduction in or Loss of Suitable Foraging Habitat: *Not Significant* effect because both permanent and temporary land use change will only occur at the Mountphilips Substation site with all the other works (the underground cabling) essentially taking place on paved roadways, where there is no potential for any suitable habitat loss. The amount of suitable habitat loss at the Mountphilips Substation site will only be a very small area ($^1/_7$th of an acre) of wet grassland which will permanently change to new access road. As

the nearest nest is 4.6km from Mountphilips, it is considered to be not suitable habitat, based on distance from nest.

Disturbance/Displacement of foraging (hunting) Hen Harrier **during the breeding season** from construction activity. There will be a *Not Significant* effect because works for the underground cabling along the public road will not take place during the breeding season, works will only take place at the Mountphilips Substation Site which is outside the SPA and 4.6km from the nearest nest. Therefore no significant disturbance will be caused.

Disturbance/Displacement of foraging (hunting) Hen Harrier **outside the breeding season** – the impact is evaluated as *Not Significant*. There are two potential impacts from disturbance during the non-breeding season: 1) disturbance/displacement when foraging; and 2) disturbance to birds at their night-time roosts, which has been excluded as no significant effects are reasonably foreseeable due to distance between UWF Grid Connection works and identified roost sites. The selective timing of works in proximity to any new roosts found before construction starts, will avoid disturbance to birds commuting to communal roosts sites. Disturbance/Displacement when foraging will be negligible because there are no Winter Roosts near the development sites; there is ample foraging habitat away from the works areas; disturbance will be brief and temporary at any one place and typically wintering birds are used to moving through the wider Irish landscape and encountering sources of intrusion/disturbance.

Reduction in prey items (small birds and animals to hunt): Due to excavations and land cover change. *Imperceptible* impact because this could only happen at the Mountphilips site – the rest of the site is along public road where there will be no land cover change and where there are no suitable prey items. The amount of suitable land to be changed at Mountphilips is negligible and the site is 4.3km from the nearest nest.

8.3.2.6 General Birds

Meadow Pipit: Habitat Loss: Suitable breeding habitat occurs at the Mountphilips Substation site. Permanent loss of suitable breeding habitat will be 1.75 hectares in total, most of which is improved agricultural grassland, with the remaining very small amount the more valuable wet grassland. The effect will be *Not Significant* because of the very small amount of suitable habitat lost and the availability of similar habitat in the surrounding area.

Golden Plover: Habitat Loss: As an Annex I species, Golden Plover is a High Sensitivity bird. Permanent land-use change will occur at the Mountphilips Substation site however, the habitats present at this location are not suitable for Golden Plover because it is mainly enclosed improved grassland fields, and therefore no effective habitat loss is expected to occur. Therefore the effect of the development is evaluated as *Imperceptible*.

Golden Plover: Disturbance/Displacement due to construction noise and visibility of machinery and workers. As works will only be conducted during daylight hours, disturbance to birds foraging at night (when most foraging takes place) is avoided. The effect is evaluated as *Not Significant* because although the species is of high sensitivity, no Golden Plover were recorded at the Mountphilips Substation during the bird surveys. For the cabling, the works will not be much of a contrast with the usual activities on and near the roads, such as road works or farming, and also disturbance will be brief and will end once works finish.

Kingfisher, Grey Wagtail and Dipper - Disturbance/Displacement: due to construction noise and visibility of machinery and workers. There is suitable habitat for Kingfisher along the larger watercourses in the vicinity of the proposed cabling, as evidenced by the record of a Kingfisher nest, 500m upstream of a cable crossing point, on the Newport River. There are suitable habitats for breeding Grey Wagtail at water crossing locations, with a probable nest recorded at one watercourse crossing. Dippers always build their nests with the opening over running water, therefore bridges are a particularly favoured habitat, although other man-made structures next to watercourses (including buildings or walls) as well as natural nest sites (such as rock-faces, tree roots or banks that overhang watercourses) are also used. Dipper nests were recorded at

three water crossing locations. The effect of the development will be *Imperceptible* because there are special protection measures built into the project design for Grey Wagtail and Dipper because their nests possibly overlap with the works; the disturbance will not contrast much from the usual activities on and near the roads and disturbance will be brief and will end once works finish.

General Birds: Habitat Improvement due to reinstatement and replanting of construction works areas with semi-mature native hedgerow and plants. The effect of this replanting is evaluated as *Slight (positive)* because of the benefit to supporting many different birds; the positive minor contrast with what is happening with land management and existing land cover in the area which is not helping with bird diversity; the permanent duration of habitat improvement.

8.3.2.7 Bats

Destruction or disturbance of bat roosts in trees due to removal, trimming or pruning of mature trees and hedgerows. The effects are evaluated as *Imperceptible* because only two trees of moderate suitability to bats will be affected, located at the Mountphilips Substation site entrance. The other four trees at the Substation, have low suitability for bats and the likelihood that bats would occupy any of these trees at the time of felling, is considered to be low. Four trees (all of low suitability) are near the underground cabling works on the public road, but these trees will not need to be felled. These trees will be checked before works begin to establish if there are bats roosting in trees and also project design measures will prevent damage to the roots of nearby trees.

Destruction or disturbance of bat roosts in bridges due to trenching works for the underground cable, and works to bridge parapet walls. The underground cable will cross a number of bridges and culverts (pipes channelling water), all within the existing road foundations. The effect is evaluated as *Imperceptible* because although two bat roosts could be affected, both of these are of Negligible Importance because they are day-roosts and in any case 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. Both temporary and permanent clearance of short sections of habitats such as Hedgerows will be required for some of the construction works, particularly along the route of the new access road to Mountphilips Substation. The removal of this habitat would not kill or injure any bats, but it could disrupt their behaviour, reducing the value of regular feeding areas and forcing bats to use alternate commuting routes. Replacement hedgerows will be planted with semi-mature (locally sourced, native) trees, and that will reduce the time required for the vegetation to grow to the original height. The effect is evaluated as *Imperceptible* because only a small amount of hedgerow will be permanently lost, and the 700m of additional hedgerow that will be planted 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 effect will be *Imperceptible* because of the project design measures to protect bats from disturbance such as lights will be hooded and directed to prevent light spilling onto bat roosts or key commuting routes / feeding areas and any lighting that is required will be activated on a timer and will not be on all night.

8.3.2.8 Non-Volant (non-flying) Mammals – Otter and Badger.

Otter: Disturbance/Displacement due to construction noise and visibility of machinery and workers. Evidence of Otter was found at three watercourse crossings locations or surrounds. No active breeding or resting sites were identified near the works locations. No instream works or culvert replacement works will be required at any of these locations. The underground cable and will be trenched in the road on the bridge over these watercourses. The effect is evaluated as *Slight* because of the very high sensitivity of otter, however the works will be minor, there are no holts or resting places nearby, works will take place during daylight hours, and from the surface of the bridge only, and any Otter present will be used to traffic already at these bridge crossing locations.

Badger: Habitat Loss due to construction of new access roads and compound. This will only happen at the Mountphilips Substation site because there will be no land involved in the underground cable public road route. There were no active badger setts or other signs of badger activity recorded during the field surveys in 2019, but there were some signs at the substation site and at one point on the cable route, in a previous study in 2017. However there are areas suitable for badger near the works and therefore it is assumed that badger might feed in the area. The effect is evaluated as *Not Significant* because there were no badger setts recorded near the works, there is plenty of suitable habitat not affected by the works and badgers roam a very large territory and badgers generally do not look for food along the roads (cable route).

Badger: Disturbance/Displacement due to construction noise and visibility of machinery and workers. Disturbance could only be caused by groundworks at the Mountphilips Substation site. Habitat along the road cable route would not be used for hunting for food. At the Substation site, suitable habitat, consisting of grassland and hedgerow, occurs with badger evidence previously recorded. The effect is evaluated as *Imperceptible* because of the absence of badger setts within 50m of the works, the works will only last a short while and all works will be carried out in daylight hours.

8.3.2.9 Amphibians & Reptiles

Suitable habitat exists in the surrounding area for Smooth Newt, Common Frog, and Common Lizard. Any *impacts to these Amphibians & Reptiles are expected to be Neutral* because of the extent of land cover change (including hedgerows and trees) is very small and there is plenty of that type of land in the immediate surrounding area, works will be of a brief duration and lands outside of Mountphilips Substation and Access road will be reinstated to natural land cover, the same as before.

8.3.2.10 Marsh Fritillary

Habitat Loss: No suitable habitat for Marsh Fritillary was recorded on or adjacent to the lands at Mountphilips Substation site. Outside of the Mountphilips Substation site, the underground cable is located entirely in the paved surfaces of roads which are not suitable habitat for Marsh Fritillary butterfly. Therefore there is *No Likely Impact.*

8.3.3 Matters evaluated as having No Effect

The following effects were not evaluated in detail as **they were considered to be Neutral if occurring at all**

- 19 no. European Sites (16 SACs and 3 SPAs);
- 3 no. National Sites (3 NHA's);
- Aquatic Habitats & Species: Habitat damage due to increased nutrients or nitrogen as a result of storage of forestry brash, tree felling, hedgerow trimming or vegetation clearance during construction, operation or decommissioning.
- Terrestrial Habitats: habitat degradation or fragmentation into separate parcels, loss of Flora Protection Order species or the introduction of invasive species; operation and decommissioning effects.

- Hen Harrier bird: **During Construction** - Reduction in or Loss of Suitable Nesting Habitat or Winter Roosting Habitat due to Land cover change; Death of Hen Harrier in or at Nest Sites or Roost Sites due to forestry felling, vegetation clearance or movement of machinery; Disturbance/Displacement of Nesting or Roosting Hen Harrier due to noise and human activity. **During Operation** – Death due to new above-ground structures and new access road; Disturbance/displacement to nesting or roosting Hen Harrier and foraging Hen Harrier (breeding and non-breeding) due to Noise and human activity. **Decommissioning Stage** - Disturbance /displacement due to noise and human activity.
- General Birds: habitat loss for Merlin, Red Grouse, Curlew, Kingfisher, Grey Wagtail and Dipper; Disturbance to Meadow Pipit, General Birds, Red Grouse, Merlin, Eurasian Curlew, Peregrine and Barn Owl; physical injuries and destruction of nests or chicks of General Birds, Dipper, Grey Wagtail and Barn Owl; displacement/disturbance effects to ground nesting birds i.e. Meadow Pipit and disturbance to Golden Plover, Curlew, Red Grouse and Merlin; operation and decommissioning effects.
- Bats: roost destruction during felling or hedgerow trimming; destruction or disturbance of bat roosts in buildings; disturbance of bat roosts from construction noise; negative effects during the operation or decommissioning stages.
- Other mammals (non-flying): loss of habitat for Otter; accidental death during construction of Otter, Badger, Pine Marten, Red Squirrel, Fallow Deer, Irish Hare, Hedgehog and Irish Stoat; introduction or spread of invasive species - White Toothed Shrew – during construction; habitat loss and displacement, disturbance or accidental death of general mammals; operation and decommissioning effects.
- Marsh Fritillary butterfly: habitat degradation by the introduction of invasive species, by changes to land drainage, by soil compaction; accidental death during construction; disturbance from construction works; destruction of larvae from construction machinery; operation and decommissioning effects.

8.3.4 The cumulative effects

When the effects of UWF Grid Connection on Biodiversity are considered with the effects of - UWF Related Works, Upperchurch Windfarm, UWF Replacement Forestry and UWF Other Activities and Bunkimalta Windfarm, Castlewaller Windfarm, Newport Distributor Road, Forestry, Agriculture and Turf Cutting - the summary result **is that the cumulative effects will not be significant.**

8.3.5 Best Practice

Best Practice Measures will be implemented during construction and operation relating to the protection of surface water quality which is important for the protection of Biodiversity.

8.4 Conclusion

The experts who examined this topic concluded that **no significant adverse effects** to Biodiversity will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project, or cumulatively other projects or activities.

NTS of Chapter 9: Land

The study in Chapter 9: Land relates to the land and landuse in the area.

9.1 How the Land study was carried out

The study on Land, was carried out by Andy Dunne of Environmental Agricultural Engineering Consultancy.

The effects on **Agricultural Land** and **Forestry Land** were studied. The landholdings in the area make up the study area for Land. **No felling will be required. No off-road works, outside of Mountphilips Substation site will be required.**

The Department of Agriculture, Food and Forestry's Rural Development Programme 2014-2020 along with the State of the Environment Report 2016 were examined. Other sources of information on Land in the area included the websites of National Parks and Wildlife Services, Bing maps and Google maps; and North Tipperary County Development Plan 2010 (as varied). A site visit and field walking was carried out on lands within and beside, the proposed development site.

9.2 Lands and Land-use in the area

The dominant landuse locally 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 unsurfaced farm access roads serving domestic houses, farms and forest also feature in the existing land use pattern.

No tillage farming was observed. The quality of the grassland varies with some being well improved from a farming perspective to grassland which is noticeably less productive. Livestock farming, dairying and beef cattle rearing, are the main activities carried out.

Some of the land being used is **located in the Slievefelim to Silvermines mountains uplands**, the highest points of which **remain generally unenclosed**. Large parts of these uplands are designated as a **Special Protection Area (SPA) for the hen harrier bird**. The SPA designation effectively restricts farming usage to low intensity grazing and new forestry plantation is not permitted there.

9.3 What possible effects on Land were studied?

Agricultural land and Forestry Land in the surrounding area could be negatively affected if there were significant loss of use or loss of connection between land parcels, during either the construction or the early operation stage; if a reduction in grass/forest growth rates was caused, due to change in the drainage regime during construction; or a change in land-use and connectivity of land/forests was caused through the splitting of parcels of land during the operation stage. Land/forests could be positively affected if there was a significant improvement in farm roads due to the development.

9.3.1 Measures to avoid, prevent or reduce negative Effects on Land

A Project Design Measure was developed to protect Agricultural Land. At the Mountphilips Substation site, construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted.

9.3.2 The effects of the UWF Grid Connection

9.3.2.1 Agricultural Land

Loss of Use and Connectivity of Landholdings: The construction works area is on 4.8 hectares of agricultural land spread over 3 No. agricultural landholdings - with two landowners at the Mountphilips Substation site and one landowner at the already permitted Upperchurch Substation. Agricultural Lands within the construction works areas will be fenced off and unavailable for farming use during construction and in the early operational stage until vegetation has re-established. The underground cabling will be laid under the public road, with no productive land value. Because of the small amount of agricultural land involved (just at Mountphilips Substation) the effects are predicted to be **Imperceptible** (which is an effect capable of measurement but without significant consequences).

9.3.2.2 Forestry Land

Loss of Use and Connectivity of Landholdings: The development crosses one forestry landholding, at the Upperchurch Substation end of the underground cabling, however in this landholding all construction works for the cable will take place on an existing private paved road. No felling or off-road works will be required. Therefore the effects will be **Neutral** (has no effect).

9.3.3 Matters evaluated as having Neutral Effect

The following effects were not evaluated in detail as any possible effects would be so small as to be considered **Neutral**– a reduction in grass/forest growth rates due to change in the drainage regime during construction; or a change in land-use and connectivity of land/forests through the splitting of parcels of land during the operation stage or an improvement in farm infrastructure such as roads.

9.3.4 The cumulative effects

When the effects of UWF Grid Connection on Land are considered with the effects of - UWF Related Works and Upperchurch Windfarm - the summary result **is that the cumulative effects will be Imperceptible and therefore will not be significant.**

9.4 Conclusion

The expert who examined Land concluded that **no significant adverse effects** to Land will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project.

NTS of Chapter 10: Soils

The study in Chapter 10: Soil relates to the **top soil or peat, subsoil** (called overburden) and the **underlying bedrock** (geology) in the area. Soil supports a range of critical functions such as land based ecosystems and biodiversity, agricultural food production, flood alleviation, water filtration and storage, and carbon capture.

10.1 How was the Soils study carried out?

The study on Soils, was carried out by David Broderick and Michael Gill of Hydro Environmental Services.

The effects on **Local Soils, Subsoils & Bedrock** and on soils in the **Lower River Shannon SAC,** were studied in depth.

National Roads Authority and Institute of Geologists Ireland Guidelines on the Assessment of Soils and Geology in EIA Reports, have been considered during the preparation of the evaluation.

Sources of information on the specific area under study came from **Desktop investigations** using the Environmental Protection Agency, Geological Survey of Ireland, National Parks & Wildlife Services Public Map Viewer **databases** and review of the existing EIS, planning documents and site investigation data from the already consented Upperchurch Windfarm file; and Chapter 9: Land. **Fieldwork** including **walkover surveys and geological mapping** of the Mountphilips Substation site and four trial pit investigations at Mountphilips and three trial pits along the underground cable route, in order to assess **soil / subsoil characters, subsoil depth and ground conditions.**

10.2 The Soils in the area

Soil, subsoil and bedrock in the area are for the most part not designated and the soil types are locally and regionally abundant and are not unique in any way. The UWF Grid Connection will be located on agricultural grassland (Mountphilips Substation site) and within the public road (Underground Cable placement). The soils in agricultural lands at the Mountphilips Substation site and at the Consented Windfarm Substation location, and the soils underlying the public road pavements and the private paved road have been heavily altered by the existing landuse. The development is not located within, or in close proximity to any National Heritage Site or Geological Heritage Site. Therefore, **the soil, subsoil and bedrock** at the vast majority of the development locations can be considered to have a **low to medium geological importance**.

The exception to this importance rating occurs where the underground cable route briefly passes through the boundary of the Lower River Shannon SAC at six locations, but this only occurs within public road pavements and at existing crossings at these locations.

10.2.1 What possible effects on Soils were studied?

In total, approximately 28,680m^3 of Soils 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 underground cabling. The public road excavations will be removed to a licenced waste facility.

Possible effects during construction were studied, such as excavation and relocation of soil, subsoil and bedrock; or soil and subsoil compaction and erosion; and contamination from oils, fuels, chemicals and cement based products.

The possible effects on the **Lower River Shannon SAC during the construction stage** of excavation and relocation of soil, subsoil and bedrock; or contamination from oils, fuels, chemicals and cement based products, were studied.

10.2.2 Measures to avoid, prevent or reduce negative effects to Soils

At the beginning of the design of the development, the design team evaluated the potential for significant impacts to all aspects of the environment. Potential or likely significant impacts were avoided, prevented or reduced by integrating Project Design Environmental Protection Measures into the fundamental design of the development. The full list of Environmental Protection Measures are listed in Volume D: UWF Grid Connection Environmental Management Plan.

General **Project Design Environmental Protection Measures** which were **designed to protect Soils** include restrictions of traffic movement across ground adjacent to the works area (to prevent compaction); use of pre-cast concrete at watercourse crossings at Mountphilips, for culvert replacement and joint-bay chambers (instead of using large amounts of wet concrete on-site); restrictions on refuelling near watercourses and control of storage of fuels and chemicals - to prevent contamination; and soil berms will be graded and reseeded as soon as possible (to prevent erosion).

Project Design Environmental Protection Measures, particularly relevant to the **Lower River Shannon SAC,** have been developed and these include restrictions on the operating works area within the boundary of the SAC; restrictions on storage of excavations; design of watercrossings within the SAC boundary; refuelling within 100m of the boundary of the River Shannon SAC will not be allowed; and restrictions on carrying out works in very wet weather.

10.2.3 The effects of UWF Grid Connection

10.2.3.1 Local Soils, Subsoils & Bedrock

Excavation and relocation of soils, subsoil and bedrock from its natural location to a new location during construction. There will be a **Slight Impact** because of the relatively small volumes involved by virtue of the cable trenches being relatively shallow and the excavations will be spread out over a large geographical area, over the length of the cable; the relatively shallow nature of excavations for the substation; only the soil directly involved will be impacted; all permanent excavated areas at Mountphilips Substation site will be backfilled, and the surrounding soils will be fully reinstated and landscaped immediately after the works; and all excavations along the underground cabling route will be backfilled and fully reinstated at the soonest practicable opportunity, after the work.

Soil and Subsoil Compaction from construction machinery: **The effect will be Imperceptible** because any impact will be limited to the Mountphilips Substation site where the extent of compaction will be small; works, machinery and traffic will be restricted to the construction works area; and the underground cabling is along the carriageway of public roads where no further soil compaction is likely.

Soil and Subsoil Erosion from groundworks and storage of topsoil during construction: The effect will be **Imperceptible** because the underground cable is along the carriageway of public roads (or along the private paved road) which provide a hard surface for construction traffic; the exposed subsoil along the cable route will be largely contained within a trench and therefore the potential for erosion is low; and the

potential erosion of soil berms at Mountphilips (created by excavations for new road across the field to the substation) will be eventually limited by reseeding and vegetation growth on the berms.

Contamination from Oil, Fuels & Chemicals from spillage and leakage from plant and vehicles particularly during refuelling or storage of oils and fuels during construction will be **Imperceptible** because, only relatively small volumes of fuels or oils will be on-site at any one time; and all fuels and chemical wastes will be stored in secure, bunded and covered storage containers.

Contamination from Cement based compounds due to direct contact during construction will be **Imperceptible** because there will be no mixing of large batches of cement on-site therefore large volumes of cement will not be present at any one time; only precast concrete structures will be used at joint bays and at watercourse crossing locations; although wet cement will be used in the cable trench and Mountphilips substation / end mast foundations, any effects on the local soil will only persist until the concrete mix has hardened.

10.2.3.2 Lower River Shannon SAC

Excavation and relocation of soils, subsoil and bedrock in the NHA: **The effect will be Imperceptible** because there will be no excavation of the river bed or banks or any off-road locations within the boundary of the SAC associated with either the Newport (Mulkear) or Bilboa rivers; the only overlap is within public road pavements; all works will be temporary and passing in nature; and there will be no removal of mineral subsoil within the SAC.

Contamination from Oil, Fuels & Chemicals: **The effect will be Imperceptible** because all excavations within the SAC will be within the road pavement, where there is low potential for contamination of soils; the small scale and short duration of the works within the SAC; the small volume of fuels/oils that will be present and unlikelihood of large spills/leaks because of the Project Design Environmental Protection Measures.

Contamination from Cement based compounds: **The effect will be Imperceptible** because the volume of cement to be used within the SAC will be minimal (<360m^3) due to the relatively short length of works within or in close proximity to the SAC boundary; and contact with the cement will be limited to mainly asphalt/hardcore underneath the existing public roadways.

Note: Imperceptible is an effect that can be measured, but the effect does not have any significant consequences

10.2.4 Matters evaluated as having No Potential and Neutral Effects

There will be no requirement for any major excavation work or groundworks during the operational phase. All ground that was previously exposed during excavation works, will have vegetated over and therefore there will be **No potential for erosion**.

Erosion or compaction effects were not evaluated in detail for the Lower River Shannon SAC because effects were considered to be **Neutral** due to no sources of effects within the SAC i.e. no new roads, no storage of soils and no soil compaction from machinery. The overlap between the SAC and the development is only along the public road.

10.2.5 The cumulative effects

When the effects of UWF Grid Connection on are considered with the effects of the Whole Windfarm Project, the summary result **is that the cumulative effects will range from No Cumulative Impact to Imperceptible to Slight/Moderate** (excavations outside of the SAC) **and therefore will not be significant.** There is **No Potential for cumulative effects on the Lower River Shannon SAC.**

10.2.6 Best Practice

Best Practice Measures will be implemented during construction relating to protection of surface water and groundwater quality which will also protect Soils.

10.3 Conclusion

The experts who examined this topic concluded that **no significant adverse effects to Soils will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project**.

NTS of Chapter 11: Water

The study in Chapter 11: Water relates to the **surface water** which includes rivers, streams and drains and **groundwater** like aquifers, wells and springs; **water dependant designated sites** like Special Areas of Conservation (SACs) and Natural Heritage Areas (NHAs) and **special natural areas** dependant on good water quality.

11.1 How was the Water study carried out?

The study of the effects on Water, was carried out by David Broderick and Michael Gill of Hydro Environmental Services.

The effects on **Local Surface Water Bodies**, **Local Groundwater Bodies**, **Local Wells & Springs**, and effects to water in the **Lower River Shannon SAC**, **Lower River Suir SAC** and **Local Water Dependent Habitats** were studied.

Sources of information on the area under study and standards for the assessment to be carried out, came from; **Consultation** locally and **nationally with specialist bodies such as Inland Fisheries Ireland, Irish Water, Office of Public Works and the National Federation of Group Water Schemes; and Guidelines** and **Publications** from the **National Roads Authority,** the **Institute of Geologists Ireland, Inland Fisheries Ireland, Environmental Protection Agency**, **Forestry Commission, Coillte** and the **Forest Service**, the **EC Water Framework Directive** and **National and UK** guidance on controlling pollution. **Desktop investigations** of website-based databases of the **Environmental Protection Agency, Geological Survey of Ireland, Met Eireann, National Parks & Wildlife Services, Water Framework Directive, OPW Flood Maps and Catchment Flood Risk Assessment and Management; Planning Documents** relating to a) the Other Elements of the Whole Upperchurch Windfarm Project and b) other relevant projects and activities and Chapter 10: Soils and Chapter 8: Biodiversity.

11.1.1 Summary of Fieldwork Surveys

The following is a list of **Fieldwork** conducted relevant to Water Chapter;

- Walkover survey and hydrological mapping of the whole underground cable route;
- Mapping and examination of all watercourse crossings in the construction works area;
- Two rounds of water sampling were completed in January and June 2019, at nineteen of the larger watercourse crossings along the underground cabling route. Seven additional water samples were taken further downstream, in the Killeengarriff and Bilboa sub-catchments;
- Well survey and door to door survey of private dwellings and their associated water supplies (wells or springs if present) within 50m downslope of construction works areas
- A site specific Flood Risk Assessment was undertaken.

Results of these field surveys are described in detail in Chapter 11: Water of the EIAR Main Report (Volume C2).

11.2 The Water in the Area

Surface Water Bodies: The Mountphilips Substation site and c.29km of the underground cabling will be within the regional Mulkear River catchment of the River Shannon surface water catchment. The remainder c.1.5km of the cabling, is located in the River Suir surface water catchment. The relevant sub-catchments within the Lower Shannon surface water area include the **Newport, Killeengarriff and the Bilboa Rivers**. The relevant sub-catchment within the River Suir area, is the **Clodiagh River**. The Lower Shannon and River Suir surface water areas both contain Natura 2000 designated sites downstream of the development (i.e. Lower River Shannon SAC and Lower River Suir SAC respectively).

There is a total of 68 watercourses to be crossed by the development, with 52 of these having Low to No fisheries value, being either **minor streams or drains**. Three crossings are located at Mountphilips Substation site and two crossings at Consented Upperchurch Windfarm Substation site along the private paved road. The remaining 63 watercourse crossings are located along the route of the underground cable, all within the public road network. All of the crossing (except the three at Mountphilips) are at existing watercrossings points at either culverts (stone or concrete pipes) or bridges.

Three **larger watercourse crossings** of note will occur, these watercourses include the Newport River at **Rockvale Bridge**, north of Newport town; the Clare River at **Tooreenbrien Bridge** on the Limerick to Thurles Road, near Lackamore; and the Bilboa River at **Anglesey Bridge**, on the Limerick to Thurles Road near Kilcommon. These rivers will be crossed by installing the **cable trench in the road over the bridges**. Two other watercrossings along the cable route in the Public Road, will be accomplished by directional drilling under the water.

The **Environmental Protection Agency (EPA)** and **Water Framework Directive Status** and Risk Result for surface water bodies in the area are typically '**Good to High'** and **'Not at Risk'**, respectively. The results of the water sampling carried out by the promoter, were the same as the EPA and Water Framework Directive status.

A **Flood Risk Assessment** was carried out and found that increased local flood risk as a result of the proposed developments was extremely unlikely because the majority of the UWF Grid Connection works are underground (cabling) and the footprint of the over ground permanent infrastructure (Mountphilips Sub-station) is minimal and outside of mapped flooding areas.

Local Groundwater Bodies: In respect of Groundwater, the UWF Grid Connection is mainly located within the **Slieve Phelim Ground Water Body catchment**, with the remainder of the development within the **Templemore A: Ground Water Body catchment**. Both Ground Water Bodies are assigned **'Good Status'** by the Water Framework Directive.

Local Wells & Springs: Private water supplies comprise groundwater wells from the underlying bedrock aquifers or from shallow springs. There are **five private wells** and **three Irish Water wells** within a **50m corridor downstream** of the works. There are **public water mains along almost of the length of the cabling route**.

Lower River Shannon SAC: The majority of the development will be **upstream of the SAC**, with the exception of part of the underground cabling which **overlaps the SAC boundary** at the **Rockvale Bridge and Anglesey Bridge crossing** and at **four short stretches along the public roads**. There will be **no in-stream works or joint bays works** carried out within the SAC boundary.

Lower River Suir SAC: Works in the Clodiagh River catchment will take place c.12km upstream of the **Lower River Suir SAC** boundary.

11.3 What possible effects on Water were studied?

The following effects were studied - Construction activities that could cause **sediment (i.e. soil) laden run-off** into rivers, streams and drains such as **tree felling; excavations** and **storage of soils**; **dewatering** cable trenches and **watercourse crossing works. Fuels, oils, chemicals and cement** can cause contamination. The watercourses themselves can be affected by **changes to the shape of the channel** due to in-stream works. **Increased flood risk** during the operation stage was studied due to runoff from permanent hardstanding areas and roads or from new permanent watercourse crossings (culverts). Therefore the possibility of these effects happening must be studied.

11.3.1 Measures to avoid, prevent or reduce negative Effects to Water

At the beginning of the design of the development, the design team evaluated the potential for significant impacts to Water. Potential or likely significant impacts were avoided, prevented or reduced by integrating Project Design Environmental Protection Measures into the fundamental design of the development.

For example, measures were designed to control refuelling of plant and the storage of fuel, oils and chemicals; permanent drainage was designed for the Mountphilips Substation area; during construction any sediment laden or contaminated water will be intercepted before run-off into water bodies and additional measures will be in place for works within the Lower River Shannon SAC and within 50m of water bodies with fisheries values; at Mountphilips, soil excavations will be stored appropriately away from water and with silt fencing in place; road excavations will be removed to landfill; only pre-cast concrete culverts will be used for replacements at watercourse crossing points and these will be large enough for flood events; only pre-cast concrete chambers will be used at joint bays; replacement concrete culverts in rivers and streams with fisheries values will be bottomless; joint bays will be located 50m from water with fisheries values; some concrete will be used in the trenches - for concrete trucks, only chutes will be washed out at the works locations into the cable trench, with the washout of the tank taking place at the concrete supplier depot; further controls will be put in place for concrete use within the boundary of the Lower River Shannon SAC; instream works or culvert replacement at streams/rivers with fisheries value will only take place under guidance from Inland Fisheries Ireland (July, August and September); a line of silt fencing and sandbags will be erected along the edge of the road to direct surface water runoff from the works areas into the excavated trench, where it can be treated before being release; cabling works outside of Mountphilips Substation site will be carried out entirely on paved roads and where the cabling crosses watercourses, the works will be carried out over the existing bridges and over/under existing culverts; all construction works will be monitored on a daily basis by the Environmental Clerk of Works; and water quality monitoring of the watercourse immediately downstream of the works will be carried out throughout the construction period.

The full list of Environmental Protection Measures are listed in Chapter 19 of this Non-Technical Summary.

11.3.2 The Effects of UWF Grid Connection

11.3.2.1 Local Surface Water Bodies

The experts' overall conclusion of effects on water quality during construction from sedimentation and contamination and on water quality during the operation phase from run-off from permanent hardstanding at Mountphilips Substation, is that there will be no effects greater than **Imperceptible to Slight** based on the following reasons;

- The **negligible to small extent of the works**, in the context of the large geographical area of the development – Substation in Mountphilips and a 30km long narrow cable route to the Upperchurch Windfarm substation.
- Between the Mountphilips Substation Site and the Upperchurch Windfarm substation the underground cabling will be **trenched along public roads**.
- The vast majority (29.2km of 30.5km) of the cabling is in roadways and therefore existing road drainage is likely to limit any significant water inflows into the trench. There will be **no direct discharge of treated water into any watercourse or drain**.
- The **Project Design Environmental Protection Measures** (mitigation measures), that have been built into the design of the development, lessen the risk of sedimentation and contamination events.
- The underground cable works will be **brief and temporary at each location**. Each section of the underground cable trenching will be finished and reinstated before the crew moves on to the next section. Construction work will be carried out in stages over a period of 10 to 12 months within a very large geographical areas.
- The watercourse crossings required for the cabling are **distributed across several local surface water bodies over a large geographical area**. The watercourse crossing works required for the grid connection development are largely located within the River Shannon catchment while the watercourse crossings required for Upperchurch Windfarm and Related Works are largely located in the River Suir surface water catchment.
- The **minor nature of the watercourses to be crossed** (over three-quarters (76%) of which are drains or marginal watercourses, with either low or no fisheries values.
- Existing culvert replacements (at watercrossings) may potentially be required at 13 locations; of which **12 are drains and marginal watercourses which have typically low flows or no flows**, and therefore the effectiveness of them acting as surface water flowpaths to more sensitive downstream surface watercourses are limited.
- For directional drilling works at two watercrossings, **the launch pits and reception pits will be entirely located within the public road surface** and therefore significant generation of sediment laden runoff is not expected.
- **No tree felling** is required.
- Only relatively **small volumes of fuels / oils will be on-site** at any one time (from construction plant and machinery). All fuels, oils and chemicals will be stored in a dedicated bunded area at the Temporary Construction Compound at Mountphilips substation site. There will be **no batching of wet cement on-site**, and therefore significant volumes will not be present on-site at any one time – **pre-cast concrete** culverts and joint bay chambers will be used.
- Installation of **permanent drainage** including settlement pond/silt traps at **Mountphilips Substation and Access Road** for reduction of runoff rates

In relation to altering the shape of the water channels, the experts conclude that the effect will be **Imperceptible** generally for the reasons set out above and also

- **50 of the 68 watercourses have been in some way altered** by the fact they are already culverted under roads; and the effects will typically be brief to temporary in nature and reversible with reinstatement of the watercourse channel.

11.3.2.2 Local Groundwater Bodies

Decrease in Groundwater Quality: **The Impact will be Imperceptible**.

Changes to Groundwater levels (quantity): **The Impact will be Imperceptible**.

The experts **overall conclusion of Imperceptible effects on groundwater bodies** from contamination by cement, fuels, oils and chemicals (leading to decrease in groundwater quality) or due to dewatering of excavations (leading to changes in groundwater levels) is based on the following reasons;

- The **Project Design Environmental Protection Measures (mitigation measures),** that have been built into the design of the development, lessen the risk of contamination events;
- **Very small volumes of fuels and oils** will be required (for vehicles and machinery only). Fuels and oils will be stored securely in designated bunded areas. Any accidental minor (low volume) spills on the ground surface will likely be absorbed by the underlying soils/subsoils and not be leached into the underlying groundwater.
- **Very small volumes of cement** will be required in the cable trench and for the new substation and end-mast foundations. In the cables trench, concrete and possible runoff will be contained within the excavation. Each section of cable trench will be backfilled with excavated material, before the next section of the trench commences. Because the cable trench area is mostly dry underground and is shallow, it is expected that concrete could only come in direct contact with groundwater closer to the larger watercourse crossings. At these, effects would only be temporary and would only persist until the cement mix has hardened and the high alkalinity is diluted by rainfall or groundwater flow. The effects would be assimilated by the local groundwater flow.
- The majority of underground cabling trench is along the carriageway of public roads and therefore no dewatering is likely.
- The shallow nature of the excavations for the cable trench and joint bays.
- Based on the trial pit investigation, it is predicted that the vast majority of the cable trench excavation will be dry and therefore will not require dewatering.

11.3.2.3 Local Springs & Wells

Five wells, which are located within 50m downslope of the construction works, could potentially be affected. **No contamination from fuels, chemicals, cement or excavation dewatering are likely to occur to either of these wells, due to:**

- The trench is shallow and the wells are deep bored wells, and therefore inflows to the wells are most likely from deeper bedrock rather than shallow springs or surface water.
- In addition, all plant and machinery will be working on an impermeable tarmac surface (public road at these locations) and therefore any minor spills or leaks are unlikely to penetrate and flow towards these wells.
- Confirmatory house to house calls will be conducted prior to the commencement of works to confirm the location of any possible new wells that might be installed after the planning application.
- No refueling of plant or equipment will be permitted within 100m of known/confirmed wells.
- The use of cement for the works within 50m of the eight downslope wells (including the three Newport public water supply wells) will be limited to the trench and due to the small volumes required and the fact that no contact with the underlying groundwater is expected (i.e. dry trenches within the carriageway of road) groundwater quality effects on the downstream wells are not expected.

- Only small amounts of wet cement will required and no contact with the underlying groundwater is expected, negative effects on the downstream wells are not expected.

11.3.2.4 Lower River Shannon SAC

Decrease in Water Quality during construction works: The effects are predicted to be **Imperceptible** due to conifer plantation tree felling or earthworks or watercourse crossing works, and **Imperceptible** due to dewatering of excavations, directional drilling works and risk of contamination by cement, fuels, oils and chemicals.

The experts' **overall conclusion of no significant negative effects on Lower River Shannon SAC** from the works are based on the following reasons;

- The **Project Design Environmental Protection Measures (mitigation measures**), that have been built into the design of the development, lessen the risk of contamination events.
- The reasons set out above for no significant effect on Surface Water and Groundwater.
- The **majority of the cable and trench locations and the Mountphilips Substation site, are not located within any mapped fluvial or pluvial flood extent zones** and are considered to be areas at low risk to flooding. River flooding along the cabling route would be confined to the crossings of the larger streams and rivers. It is considered that the locations of the development are, for the most part, not susceptible to significant flooding.
- The **working footprint will be spread out over a large geographical area** (latitudinal distance of 23km) within the Mulkear River catchment.
- Mountphilips **Substation excavation works are located c. 6km upstream of the Lower River Shannon SAC**.
- **All works within the SAC will be confined to public road surface**, **and where works traversing the Rockvale Bridge and Anglesey Bridge, will be confined to the bridge.**
- The majority of the watercourses intercepted by the works area **(three-quarters) are drains or marginal headwater watercourses with low flows**, and therefore the effectiveness of them acting as a surface water flow-path to the downstream Lower River Shannon SAC is limited.
- Any **spills along the cable route are likely to be small isolated incidents and comprise very small amounts**, and the actual volumes that might reach the downstream Lower River Shannon SAC are likely to be negligible if any; the trench sections that overlap the SAC will be lined with an impermeable geotextile to prevent potential migration of cement from the trench base/sides; a member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and the Institute of Fisheries Management will be present for all concrete pours with-in the SAC overlapping sections; and the volume of cement that will be used within the SAC boundary will be small (c.250m^3); and in the context of the location of the trench in the public road pavement.
- The localised, dispersed, brief and reversible nature of the effects.
- The **small scale of the UWF Related Works and the Upperchurch Windfarm within the River Shannon catchment**.

11.3.2.5 Lower River Suir SAC

Decrease in Water Quality during construction works: There will be **No likely impact** due to earthworks; water crossing works; or due to contamination by fuel, oils, chemicals and cement-based compounds on the **Lower River Suir SAC** based on the following reasons;

- The **small amount of works (c. 1.5km of cabling) within the Lower River Suir SAC are more than 12km upstream of the SAC.**
- The **Project Design Environmental Protection Measures (mitigation measures),** that have been built into the design of the development, lessen the risk of contamination events.
- There are **no temporary or permanent soil excavation storage areas required** within the River Suir catchment.
- Only **five of watercourse crossings** associated with the cabling trench are located within the Suir sub-catchment and **only one of these may require culvert replacement**.
- The **small volumes of fuel, oil chemicals and cement** that will be present on site and the large down-stream distance to the SAC.
- **No tree felling** is required within the River Suir catchment.
- The reasons set out above for no significant effects on Local Surface Water Bodies and Local Groundwater Bodies.

11.3.2.6 Local Water Dependent Habitats

Water Dependent Habitat would describe an area that is suitable for living or feeding of particular animals or birds and which is dependent on water being present.

There is a small area of Marsh Fritillary butterfly (a protected species of butterfly) habitat near one of the elements of the Whole Upperchurch Windfarm Project and therefore the experts made a particular examination of the proposed development, to find out if there was any area in the UWF Grid Connection development site that has suitable Marsh Fritillary butterfly habitat. This is just in case that there might be in-combination effects. **These experts confirmed that there is no suitable Marsh Fritillary habitat within 50m of the construction works boundary, of the UWF Grid Connection.**

With regard to UWF Related Works, Marsh Fritillary Habitat has been mapped in wet grassland and wet heath habitat, close to the Internal Windfarm Cabling works area. The Internal Windfarm Cabling will be installed within the Upperchurch Windfarm access roads at this location. The habitats at the locations are relatively small and fragmented. The wet grassland and wet heath habitat close to Internal Windfarm Cabling locations exists upslope of the construction works area, and therefore the natural drainage is unlikely to be impeded by the construction works.

11.3.3 Matters evaluated as having No Effect

The following effects were not evaluated in detail as **they were considered to be either Neutral, not likely to occur or having no potential to occur** – surface water quality impacts from conifer plantation felling; groundwater quality effects during operation; increased flood risk or suspended solid input during the operational stage in relation to either the Lower River Shannon SAC or the Lower River Suir SAC; additionally in relation to the Lower River Suir SAC sedimentation due to excavation dewatering and increased risk of flooding during operation.

11.3.4 The cumulative effects

When the effects of UWF Grid Connection on Water are considered with the effects of UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm, the consented Bunkimalta Windfarm and Newport Distributor Road - the summary result **is that the cumulative effects will range from No Cumulative Impact to Imperceptible to Slight and therefore the effects will not be significant.**

11.3.5 Best Practice

Best Practice Measures will be implemented during construction relating to protection of Local Surface Water and Groundwater quality during watercourse crossing works; during widening or replacing existing culverts; during use of cement; during storage and handling of fuels, oils and chemicals; for the design of new permanent watercourse crossing structures to prevent flood risk; and during storage of excavations at Mountphilips Site.

A Surface Water Management Plan will provide the water management framework for construction works and will ensure that work is carried out with minimal impact on the environment.

The full list of these Best Practice Measures are listed in the Environmental Management Plan Volume D of the EIA Report.

11.4 Conclusion

The expert who examined this topic concluded that **no significant adverse effects** to Water will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project, or cumulatively with other projects or activities.

NTS of Chapter 12: Air (air quality, noise, vibration, EMF)

The study in Chapter 12: Air relates to the effects locally of the development on **air quality, noise and vibration levels and electromagnetic field (EMF)** levels.

12.1 How was the Air study carried out?

The study of the effects on Air, was carried out by Ciara Nolan of AWN Consultants (Air Quality); Peter Barry of Enovi (Noise & Vibration) and John McAuley & Lewis Brien of Compliance Engineering Ireland (EMF).

The effects on **Local Residents & Community** and **Transient People** (people working in forests and farms close to the construction works areas; walkers and cyclists on waymarked trails) were studied. The houses relevant to the development are mostly located on the local road network to the north of Newport town and also along the Limerick to Thurles Road (particularly in the Lackamore area, and in the vicinity of Rear Cross village) with some houses along the Borrisoleigh Road, in Knockmaroe area (at the consented Upperchurch Windfarm Substation side of the development). The majority of community facilities are in Newport, Rear Cross and to a lesser extent in the villages of Kilcommon and Upperchurch. The waymarked trails considered are the Slievefelim Way (walkers) and Ormond Way Cycle Route.

Sources of information on the specific area under study came from **Consultation** locally and nationally; **European Commission Directives on air quality, noise and electromagnetic emissions;** Transport Infrastructure Ireland (formally National Roads Authority) and Institute of Air Quality Management guidelines; **Desktop review** of EPA reports and modelling of dust, noise, vibration and electromagnetic field levels; **Fieldwork** including noise monitoring at a similar type of substation to the one proposed at Mountphilips and noise monitoring on-site to establish the current levels of background noise, at the nearest house to Mountphilips Substation. **Site visits to establish the location of properties, business and community facilities** close to the proposed development.

In relation to electromagnetic fields, in order to demonstrate the maximum possible electromagnetic fields (EMF) associated with the cables, in the context of international and national limits for EMF, the contribution of the **substation and underground cable at maximum power**, is evaluated.

12.2 Air in the area

The setting is **predominantly rural and away from major sources of air pollution, noise and vibration and electromagnetic fields**. The area enjoys background levels for all these effects, substantially below EU recommended limits.

The existing levels of **air pollutants** from vehicles and dust from earthworks and industrial activity are low.

The existing **noise sources** are natural sources, mainly wind and there is also man-made noise sources including farm machinery when in operation, and traffic on the nearby public road network. There are **no vibration sources** in the locality.

Electromagnetic Fields (EMF) radiate from natural and unnatural sources in the environment. In the built environment, **man-made electric and magnetic fields are** produced in all residential and working environments as a result of anything electrical i.e. electrical wiring, appliances, power lines and telecommunication masts.

The absence of intensive power and communications infrastructure results in **miniscule levels of both electric and magnetic fields in the area** – substantially less than national and international guideline levels. Local exposure is only from electrical equipment in farms, homes, businesses and community facilities and from existing power and communication lines.

What is a safe level of man-made electromagnetic fields?

Guidelines on limiting exposures of people to electromagnetic fields were published by the International Commission on Non-Ionising Radiation Protection (ICNIRP) in 1998 (and updated to a less conservative level in 2010). The European Union and the Irish Government have adopted the more conservative ICNIRP 1998 guidelines.

Exposure Characteristics ICNIRP	Electric Field Strength V/m	Magnetic Field Strength µT
1998 General Public Reference Level	**5000 V/m**	**100 µT**
2010 General Public Reference Level	5000 V/m	200 µT

The Irish Government Department of Communications, Marine and Natural Resources, have stated "**No adverse health effects have been established below the limits suggested by international guidelines**" i.e. below 100 µT (microtesla).

What is the average level of EMF in our environment?

In a recent study of homes in the UK, most homes had **average electric fields of less than 10V/m and average magnetic field levels in the range 0.2 µT to 0.4 µT** which were attributed to electrical sources (i.e., wiring, appliances, and distribution circuits). It is assumed in this report that the existing electric and magnetic field levels, at local residential dwellings and community facilities, are the same at 10V/m for electric fields and between 0.2 µT and 0.4 µT for magnetic fields. This means that the **electrical field present already is only $^{1}/_{500^{th}}$ of the guideline limit** and the **magnetic field present already is less than $^{1}/_{100^{th}}$ of the guideline limit**.

12.3 What possible effects on Air were studied?

The **existing low levels of pollutants, noise, vibration and electromagnetic fields in the Air in the area**, are typical of rural Ireland. These levels **would be sensitive to increase in levels** of dust from construction works, increased dust, noise and vibration from construction machinery and deliveries, increases in noise and electromagnetic fields from the operating substation and underground cables. If there was significant increases this could impact on Local Residents & Community and on Transient People and therefore these effects are studied.

12.3.1 Measures to avoid, prevent or reduce negative Effects to Air

At the beginning of the design of the development, the design team evaluated the potential for significant impacts to Air. Potential or likely significant impacts were avoided, prevented or reduced by integrating **Project Design Environmental Protection Measures into the fundamental design of the development**.

For example, there are measures to ensure that the hours of work are limited to **daylight hours only**; that construction works **will not be carried out within 150m of a school, during school hours** and; where works overlap with other **works or concrete haulage,** for the Whole Upperchurch Windfarm (particularly **in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands),** these works/deliveries **will not be carried out at the same time**.

12.3.2 The effects of UWF Grid Connection

12.3.2.1 Local Residents & Community

The study area for **Construction Dust; Noise and Vibration is 350m** from the construction works area - there are 391 houses and 19 public places and facilities within 350m. The study area for dust from **construction haulage is 50m** from the main transport routes – there are 312 houses and 33 public places and facilities within 50m. **Operational Noise 400m from Mountphilips Substation** is studied – there are 6 houses within 400m of the proposed substation. **Operational electromagnetic fields (EMF) for 100m from Mountphilips Substation and 100m of the underground cable** – there are no houses within 100m of Mountphilips Substation and 317 houses and 17 public places and facilities along the underground cable within 100m of the proposed cable.

(*Only predictions for the exposure of people to EMF within 100m of the perimeter fence of the substation and within 100m of the underground cable was modelled because, electromagnetic field emission levels are almost imperceptible over 100m away from the source*).

Increase in Airborne Dust: **Construction dust** will arise from construction activities such as excavations, earth moving and backfilling which may generate quantities of dust. Vehicles transporting potentially dusty material to and from the site could also cause dust, along the haul routes. There will be a **Slight negative effect from dust** due to the underground cabling works (there are no houses close to the proposed substation), because the background levels of pollution are very low in the area, but the effects will only be temporary in any one area as the works for the underground cable and traffic progresses along the road.

Increase in local noise levels: **Working plant and machinery, vehicles and excavations will increase the levels of outdoor noise.** The houses along the public roads will be exposed during the trench works for the underground cable, however the nearest houses will only be affected for brief periods of 1-2 days. Houses in the vicinity of the substation works will be exposed for longer, but these houses are much further away from the works. The impact will be **Moderate negative** because the National Roads Authority (NRA) threshold limits are likely to be exceeded at the nearest houses, at some locations for the underground cabling along the public road; however only a few locations will impacted at any one time because of the progression of the trench works along the road; exposure will be for relatively short periods of 1 to 2 days, during normal working hours and during daytime hours at any one location. Once construction ceases, the noise ceases.

Increase in local noise levels during operation: There is **No Impact predicted**. There will be **no noise from the operating underground cable**. There will be some **noise for the operating electrical plant in Mountphilips Substation**, however there will be **no impact** because of the distance to the nearest house or community facility is 385m (nearest house). For the purpose of this assessment, a noise measurement was taken from the same kind of substation, in County Kerry. Background levels of noise were also taken in the area and it was established that background noise levels are low. The noise modelling shows that the **noise at the nearest house will be well below the lowest background noise threshold**, as set by the Environmental Protection Agency (EPA), for quiet places just like Mountphilips townland.

Increase in electromagnetic fields:

Operating Mountphilips Substation - There are no local residences or community facilities within 100m of the Mountphilips Substation and therefore there will be **no increase in electric field or magnetic field** levels at these properties as a result of the operating substation.

Operating Underground Cable - There will be **no increase in electric fields** due to the complete screening of these fields by both the metallic sheath surrounding the cables and the concrete and backfill materials above the cables. There will be **some increase in magnetic field levels** at local residences and community

facilities which are within 100m of the underground electrical or communication cables along the grid connection route. The worst case increase in levels of magnetic fields at local residences and community facilities will range from:

- **Between 4.45µT and 0.13µT** for locations between **5m and 30m** from the operating cable
- **Between 0.12µT and 0.05µT** for locations between **31m and 50m** from the operating cable
- **Between 0.05µT and 0.01µT** for locations between **51m and 100m** from the operating cable

This will have an Imperceptible Impact at local houses and public and community facilities, because of the tiny level of the increases compared to EU recommendations for limits of exposure to EMF and; the new levels will be similar to existing levels in a rural area. The International Commission on Non-Ionizing Radiation Protection magnetic field **safe level is 100µT**. At the houses and community facilities within 100m of the operating underground cabling, the worst case increase in levels of magnetic fields at the very nearest houses is 4.45µT which is **less than ^{1}/200th of the guideline limit.** Also pacemakers worn by people at these houses or facilities will not be affected – these devices are tested to a limit of 100µT.

12.3.2.2 Transient People

The effects to Transient People (i.e. walkers and cyclists on public roads and way-marked trails and cycle routes and farm and forestry workers) relates to changes to **electromagnetic fields only**, as people working and moving through the area are not considered sensitive to increases in dust and noise levels as these people will be in close proximity to construction works for momentary to brief lengths of time.

Operating Mountphilips Substation: Any farm or forestry workers in the vicinity of **Mountphilips Substation** will be exposed to increased ambient **electric field of 40V/m** and **magnetic fields levels of 1µT** (measured at the substation fence). Levels fall off as you move away from the source. The safe exposure level for Electric Fields is 5000V/m and therefore the predicted exposure is less than 1/100th of the guideline limit. The safe exposure level for Magnetic Fields is 100µT and therefore the predicted exposure is 1/100th of the guideline limit.

Operating Underground Cabling: There will be **no exposure to electric fields from the underground cabling** due to the **complete screening** by both the metallic sheath surrounding the cables and the concrete and earth (backfill) materials, above the cables. Any farm or forestry works, walkers, cyclists on/users of waymarked trails within 100m of the operating cabling will be exposed to increased magnetic field levels. The worst case levels of **54µT magnetic field** will be **directly over the underground cable**. Levels drop off quickly with distance, with levels of **0.05µT at 50m,** from the underground cable. The **impact will be Imperceptible to Slight** because people will not be in close proximity for any extended period of time and only occasionally and in any case the new levels still remain at **half of the EU EMF limits**. Equally any pacemaker type devices worn by people passing close to the new infrastructure will not be affected by the an increase in magnetic fields because the increase will be significantly below the 100µT test level limit, for pacemakers.

12.3.3 Matters evaluated as having No Effect

The following effects were not evaluated in detail as it was assessed that either there was **No Potential for effects** or any effects were so small as to be **Neutral – Construction impacts** due to increases in ambient electromagnetic fields; damage to buildings due to vibration during construction; decreases in ambient air quality due to vehicle emissions, and noise and vibration **impacts during Operation**.

12.3.4 The cumulative effects

When the effects of UWF Grid Connection on Air are considered with the effects of UWF Related Works, Upperchurch Windfarm and the existing 110kV and 220kV overhead lines - the summary result **is that the cumulative effects will be No Cumulative Impact to Imperceptible to Slight and** Moderate (noise during construction) **and therefore will not be significant.**

12.3.5 Best Practice

Best Practice Measures will be implemented during construction for minimising dust emissions from site activities by implementing dust control measures; and for ensuring that operational EMF emissions are measured by a competent engineer.

12.4 Conclusion

The experts who examined this topic concluded that **no significant adverse effects** to Air will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project, or cumulatively with Other Projects.

NTS of Chapter 13: Climate

Climate is defined as the average weather over a period of time. Climate change is a natural process, but in more recent years the climate is also changing as a result of human activities, through the increases in the release of greenhouse gases. These gases are altering the earth's atmosphere resulting in a 'Greenhouse Effect'. The release of carbon dioxide from the burning of gas, oil and coal to generate electricity, is a major cause of this release of gasses and this accelerates climate change.

13.1 How was the Climate study carried out?

The study of the effects on **Climate** through the development's effects on **Climate Change**, was carried out by Ciara Nolan of AWN Consulting Ltd.

The latest **EPA data on greenhouse gas emission levels** in Ireland; the **Irish Government's Climate Action Plan 2019** and the **EU Directive 2009/28/EC** on the promotion of the use of energy from renewable sources, inform this Chapter.

13.2 Climate Change action in Ireland

Climate change is now recognised as the biggest threat to life on earth, and it is now urgent that we all take immediate action to reduce man-made 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 targets for electricity production 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.

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% or **almost one-third of Ireland's electricity demand**. This set a record, for Ireland in relation to the highest proportion in Europe of electricity demand being supplied by on-shore wind, thus impacting the Country's mitigation response 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.

13.3 What possible effects on Climate were studied?

Climate can be affected **positively by increased production of electricity from renewable sources**. Climate can be **negatively affected by construction activities**. Therefore these effects are studied.

13.3.1 The effects of UWF Grid Connection

Increase in Renewable Energy Production: The effects of the UWF Grid Connection itself will be **Neutral** because the UWF Grid Connection itself will not generate electricity.

13.3.2 Matters evaluated as having No Effect

The following effect was not evaluated in detail as they were considered to be **Neutral for both the construction and operation stage** – increase in national levels of greenhouse gas emissions due to construction activities.

13.3.3 The cumulative effects

UWF Grid Connection, is required in order to **connect Upperchurch Windfarm to the National Grid** and thereby transport wind generated electricity from Upperchurch Windfarm to the National Grid, to be used by homes and businesses in the area surrounding the connection point – in this case onto the Killonan to Nenagh overhead line (which connects to Killonan ESB Station) thus distributing electricity to Tipperary and Limerick.

Upperchurch Windfarm will generate electricity from the wind and therefore less electricity will need to be generated from oil, gas, coal or peat in Ireland. This will directly **reduce Ireland's greenhouse gas emissions from generating from oil, gas, coal or peat.** This will help us to reach Ireland's EU commitments for the production of electricity from renewable energy resources and help fight Climate Change, which is caused by greenhouse gas emissions.

Upperchurch Windfarm will generate approximately 220 million kWh units 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 oil, gas, coal or peat. 220 million kWh is enough to supply **52,381 houses (just less than half of the houses in County Tipperary and County Limerick combined)** with green, emission free electricity.

When the effects of UWF Grid Connection on Climate are considered cumulatively with the effects of Upperchurch Windfarm and other operating windfarms in the Republic of Ireland - the summary result **is that the cumulative effects will be Significant and Positive.**

13.3.4 Best Practice

The Annual renewable electricity production of the operational Upperchurch Windfarm will be recorded and reported annually according to a Best Practice Measure developed for the environmental factor Climate.

13.4 Conclusion

The expert who examined this topic concluded that while the UWF Grid Connection **will not cause any negative or positive effects** to Climate on its own, **when UWF Grid Connection is considered** as part of the Whole Upperchurch Windfarm Project **and in -combination with other windfarms in Ireland, the mitigation effect to Climate Change will be a significant positive effect.**

This is the only Significant effect (positive or negative) of UWF Grid Connection.

NTS of Chapter 14: Material Assets - Built Services

The study in Chapter 14: Material Assets Built Services relates to Built Services in the area which are mainly made up of **underground water supply pipes and overhead telephone and electricity lines**, which supply the **drinking water, electricity, telephone and broadband services** to local residents, businesses and community facilities.

14.1 How was the Built Services study carried out?

The study of the effects on Built Services, was carried out by a number of experts: David Broderick and Michael Gill of Hydro Environmental Services (water supplies); Ruairí Geary of TLI Group (electrical engineers/utility infrastructure consultancy – electricity lines), Kevin Hayes of Ai Bridges (telecommunication engineers, telecoms services).

The effects on **Local Residents & Community** and the **Electricity Transmission System** were studied.

The built services in the development area were identified by consultation with infrastructure owners; **ESB Networks, Eirgrid, Eir, Irish Water, Airspeed, Three Ireland, and Gas Networks Ireland and the National Federation of Group Water Schemes.** House calls to local residents and consultation with local landowners regarding their water supply, were also made. A review of **built services mapping** was also undertaken; a **site walkover** of the construction works areas; the **route of the underground cable was surveyed accompanied by Irish Water Area managers** and **GPS survey of all existing Irish Water/Eir/ESBN networks services, within 20m of the works areas**.

14.2 Built Services in the area

Investigations for **Irish Water mains pipes and underground electricity and telecoms cables –** within the construction works area and **overhead electricity and telephone lines** – within 7m of the construction boundary, were carried out. Electricity is supplied through overhead lines and one underground cable and these are generally located in fields beside the road network. **Telecommunication**s in the area are supplied through the **overhead lines and some underground telecommunication cables** which are generally located in roadside boundaries. An **Irish Water mains pipe runs underground, along the Limerick to Thurles Road**, within the construction works boundary of the underground cabling. There is **one water treatment plant** in New Ross, north of Newport Town and the underground **water mains** related to this plant, are located **in and along public roads** that will be used by the underground cable. There are no **group scheme wells within the works area.**

Electricity Transmission System assets relevant to the development is the Killonan to Nenagh 110kV overhead line (OHL) which is connected to the **Killonan Station, near Limerick City**. The **Mountphilips Substation** will connect onto this OHL, which passes beside the new substation, at a point approximately one third of the way along the OHL between Killonan and Nenagh.

14.3 What possible effects on Material Assets – Built Services were studied?

Without due care and precaution, the water, electricity and telecommunications network serving the locality, could potentially be damaged by **excavation works and movement of machinery for the underground cable.** Any damage to pipes, cables or lines would cause an interruption in supply to customers.

During the **commissioning of the new Mountphilips Substation**, the line between Killonan and Nenagh **will be switched out**, which has the potential to cause an interruption of power supply on the transmission electricity system. The addition of the Mountphilips Substation will **add an operational control point for ESB** on the electricity system.

These potential effects are studied.

14.3.1 Measures to avoid, prevent or reduce negative Effects to Built Services

The following is a list of the **Project Design Environmental Protection Measures**, which are built into the **Design** of the proposed UWF Grid Connection project, in order to prevent or reduce negative effects on Built Services: all construction works will be carried out during **daylight hours**; confirmatory **consultations with Irish Water, Eir and ESB** and **review of all relevant infrastructure mapping** before works, confirmatory **ground surveys at service locations**, will be carried out ahead of works; **Goal Posts** will be used to identify and highlight the **height of nearby overhead lines**; and a **banksman** will accompany each excavator to oversee all excavation works; and **digging within 500mm of pipes** in the cables trench **will be carried out by hand**.

14.3.2 The effects of UWF Grid Connection

14.3.2.1 Local Residents & Community

There are 543 properties connected to 14 Irish Water main pipe, and 1 Irish Water main pipe linking the Irish Water well supply at Castlewaller to the Irish Water treatment plant at Newross townland (part of Newport Regional Water Supply). It is assessed that **Loss of Water Supply due to damage to these water pipes during excavations will be Neutral,** because **damage is unlikely to occur** due to the implementation of protection measures set out above as project design measures, and in any case in the **unlikely event** that a mains pipe is damaged during construction works, the **pipes would be repaired within c.1 day**.

14.3.2.2 Electricity Transmission System

There is **No Potential for Impact** as there will be no interruption to electricity supply during the commissioning of the new Mountphilips Substation, when the line between Killonan and Nenagh will need to be switched out. The switching out will have no effect on supply at Killonan Station, because this substation is the feed point i.e. the power flows from Killonan to Nenagh with no lines coming off, in-between Killonan and Nenagh. Nenagh Substation can source its electricity supply during the outage from the other electricity lines on the 38kV grid network, at the Nenagh 110kV Substation.

14.3.3 Matters evaluated as having No Effect

Local Residents & Community: Loss of electricity/ communications service through damage to overhead lines and underground cables, during construction is not evaluated in detail, as such an event is considered **Unlikely**. Planned outages due to relocation of electricity or telephone poles is also considered **Unlikely.** In any case, if such an event occurs the effects will be **Neutral** due to the short duration of service interruption.

Electricity Transmission System: There will be a **positive but Neutral effect from adding a control point to the Killonan to Nenagh 110kV Overhead Line (OHL)**. The main function of the Mountphilips Substation will be to transport electricity from Upperchurch Windfarm onto the OHL, and although the addition of a new control point will be of benefit to ESB Networks in the form of a new asset and will strengthen the network

into Nenagh, it will not cause measurable positive effects to the overall transmission system because of the size of the overall transmission system.

14.3.4 The cumulative effects

There is **Neutral/ No Potential** for cumulative effects to occur with other Elements of the Whole Windfarm Project or with Other Projects or Activities in the area.

14.3.5 Best Practice

An Environmental Management Plan will be implemented during construction works and will include a Community Liaison Officer, who will be responsible for communicating with the local community and wider public during the construction stage, including keeping the local community informed of project progress and any construction activities which may cause inconvenience to them.

14.4 Conclusion

The experts who examined this topic concluded that **effects to Built Services no greater than Neutral (positive or Negative) could occur** as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project.

NTS of Chapter 15: Material Assets - Roads

The roads studied comprise the **public road network for the underground cabling** which will be along the **Limerick to Thurles Regional Road (R503) between Newport and the Borrisoleigh turn off at Knockmaroe**, and also the **Local roads between the junction at Knockmaroe and the private paved road to the Upperchurch Windfarm Substation location**, at the eastern end of the cabling route and the **Local roads north of Newport town** as far as the Mountphilips Substation site entrance at the western end of the cabling route. The roads to be used for the construction of the development, are identified on Figure NTS 1: Location of UWF Grid Connection and Figure NTS 3: Haul Route for Stone & Concrete Deliveries at the end of this Volume C1.

15.1 How was the Roads study carried out?

The study of the effects on Roads, was carried out by David Tarrant, Ruairí Geary and Daithí Barrett, all with project experience relating to the proposed works, with TLI Group. The evaluation was **prepared in accordance with Transport Infrastructure Ireland's (TII) Traffic & Transportation Assessment Guidelines and other TII Guidance**. Information was gathered through **traffic count surveys** at each affected road; road **pavement condition, road boundaries and buried structure surveys**; **consultations with Tipperary County Council Roads Department**; **examination of databases** - POWSCAR 2016 CSO Database (on vehicle use) and RSA Collision Statistics Database.

15.2 The Roads in the Area

15.2.1 Roads Affected

Public Roads at road works locations; or along routes of concentrated construction traffic; or at the substation site access point in Mountphilips will be affected by road works and construction traffic movements. The roads concerned are **Regional Road the R503, and the Local Roads, north of Newport Town and around the Windfarm Substation** (the L roads - L2166-10, L6013-0, L2156-0, L2157-0, L6009-0, L5337-1, L2264-50, L6188-0).

All of these roads are **2-way roads, 3.5 metres to 5 metres in width**, with **narrow verges** and are generally bounded along either side by **low earthen banks or hedgerows**. The road pavements consist of traditional tar and chippings, with road surface water drained to open drains, generally running along each of the roadsides. A Pavement Condition Survey was carried out and this survey rated the **Limerick to Thurles road as Good and the Local Roads generally as Good to Fair, with two Local Roads in Poor to Very Poor condition**.

There are **no vehicle weight restrictions in place** along any of the roads affected by the works.

15.2.2 The Road Users

The **Regional Road carries general traffic**, mainly comprising people commuting to work or school/college, or travelling to shops and businesses along the roads and onward towards Limerick or Thurles. A rural transport bus service provides services between Upperchurch, Klicommon and Rear Cross to the larger towns in Tipperary. Rear Cross is also along the Bus Éireann - Limerick to Dundrum - service route. It is also assumed that **tourists use these roads**, which are scenic driving routes, to travel between the towns or to access a number of walking routes and a cycle route in the area.

The **Local Roads** generally serve as access points to local residential, forestry and farm traffic and some amenity users i.e. walkers and cyclists.

15.3 What possible effects on Roads were studied?

Public Road pavements and structures (such as bridges over and pipes under the road) can be affected by road works (which will involve the excavation of the road pavement) and works at watercrossings (which will involve works at crossing structures) and by increases in traffic, particularly delivery trucks. Roadside boundaries could be damaged while creating access to Mountphilips Substation site.

Road Users could be sensitive to increases in traffic volumes, particularly trucks; presence of roadworks and traffic management measures, such as stop-go systems; and a reduction in road pavement quality which could either increase journey times or reduce road safety. Cyclists or walkers are vulnerable road users, and could be intimidated by the presence of HGVs (trucks), particularly on narrow roads. There are also two primary schools located along the route of the underground cabling on the R503 – Lackamore National School and Rear Cross National School, dropped off/ collection at school opening/closing times could be affected by increased traffic and road works nearby.

Therefore these effects are studied.

15.3.1 The Development Works and Associated Traffic

15.3.1.1 Description of the Public Roads and Watercrossing Structures affected

With the **exception of the L5337-1 Local Road at Tullow**, Newport, which is the construction material haul route, **trenching and joint bay excavation works** for the underground cabling will be carried out on a**ll of the roads**, listed above. **All of the roads listed will be affected by construction traffic**.

There are **sixty-three structures** located on the route of the underground cabling, comprising a mix of **bridges (15) and plastic or concrete pipe culverts and small masonry stone culverts (48).** Culverts are funnels carrying a stream or open drain under a road.

The bridges were inspected by Chartered Engineers from TLI Group, and they considered that **the road structure above 13 of the 15 bridges** (where trenching in the bridge, under the road cover is required) **is in good condition** and will be capable of supporting the cabling infrastructure and the increased traffic loading associated with the construction works and no works will be required to the bridge structures themselves. The **two remaining bridges do not have sufficient road depth over the bridge** arch to accommodate the cable ducting and therefore, the cabling will have cross these watercourses by **drilling the cable under the water**. Also Rockvale Bridge, Tooreenbrien Bridge and Anglesey Bridge are likely to require works to **raise the height of the parapet walls**, to compensate for raised road/footpath levels, after the cabling is installed.

The culvert structures were also inspected by TLI and they found that, of the **48 No. culverts**, **no works will be required to 35 of these**, with the cabling installed either under or over the culverts. **At the remaining 13 culverts, the existing masonry box culvert may need to be replaced** (12 of which are under the R503, and 1 under the L-2265-50).

There is **1 additional buried structure (pipe culvert) along the construction material haulage route** on the L5337-1 at Tullow. The buried structure is currently in **good condition** and will be capable of supporting the increased traffic loading associated with the construction works.

15.3.1.2 Works required on the Public Roads

The **underground cabling is almost wholly planned for the pubic road network**.

It is expected that the construction stage will commence in 2020/2021 and works on the public road **will last approximately 10 to 12 months on the Limerick to Thurles Road 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 Limerick to Thurles Road.**

There will be approximately **80m of trenching completed in a single day**. Also at the **42 Joint Bay locations on the public roads**, initial construction works for the Joint Bays will take 2 days, cable pulling works at the Joint Bays will take 3 days and cable jointing works 5 days, per Joint Bay. **31 of the Joint Bays are on the Limerick to Thurles Road**.

Cabling works will result in **one-lane closures on the Limerick to Thurles Road** and some **full road closures and one-lane closures on the Local Roads.** The **Local Roads that need a full road closure**, will be closed for periods between **1 week and 3 weeks** – these are the **two local roads north of Newport and one local road near the consented Upperchurch Windfarm Substation.** There are diversion options adding $3^1/_2$ minutes to road user's journey time, available around the Newport local road closures and a diversion adding 10 minutes to the journey time around the local road near the 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**.

Traffic counts were carried out in January 2019 at 5 locations and at 6 locations in May 2019, to measures vehicles over a 24-hour period and the results show that **traffic volumes on all the public roads to be affected are low**.

15.3.2 Measures to avoid, prevent or reduce negative Effects to Roads and Road Users

The following **Project Design Environmental Protection Measures**, are built into the **Design** of the proposed UWF Grid Connection, in order to prevent or reduce negative effects on Roads - All construction works will be carried out during **daylight hours**; **Flag-men** will be used at cabling trench works locations on the public road networks. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the road network in a safe and efficient manner; and **where works overlap** with other works or concrete haulage, for the Whole Upperchurch Windfarm (particularly in **Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands**), these works/deliveries will **not be carried out at the same time**.

Also the way the construction of the underground cable on the roads, will be carried out will **protect Roads**. These are listed below;

- Following the completion of construction works, **trenches will be reinstated** in accordance with the **national MapRoad Roadworks Licensing (MRL) system**, supported by the Road Management Office (RMO) on behalf of all local authorities and TII, in accordance with the **DoTTS Guidelines for Managing Openings in Public Roads**, and in accordance with **Tipperary County Council Road Opening Licence**.
- The **road trenching crews will only open a trench that they can finish and reinstate before the end of the day, typically 80m per crew per day**, depending on ground and weather conditions. At the end of each day, the completed trench sections will be reinstated with a temporary surface for road safety and trench integrity purposes. Full permanent reinstatement will take place at the end of construction works, or otherwise in accordance with the conditions of the Road Opening Licence.

- 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 and also, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.

- The **Traffic Management Plan (TMP) for the public roads** will be a key construction contract document, the implementation of which will reduce possible impacts which may occur due to the presence of construction traffic and works on the public roads. It is a particular objective of this plan **to control and minimise the traffic impacts of construction insofar as it may affect the local environment, local residents and the travelling public on the public roads during construction of the cable trench, through measures to maximise the safety while keeping traffic flowing as freely as possible**. The TMP will be updated from time to time to include any relevant planning conditions in addition to any new information on 3rd party road works or events, which would impact on the construction traffic route and timing. The appointed Contractor will be responsible for carrying out and managing the construction activities in accordance with the TMP.

15.3.3 The Effects of UWF Grid Connection

15.3.3.1 Effects on the Public Roads

Damage to Road Pavement

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 29km of cables trench within the road pavements. Works to road verges will only occur at Mountphilips Substation site entrance. The construction of the Joint Bays will require the excavation of an area, 2.5m wide and 6m long and 2.3m deep, to install pre-cast concrete chambers for the **forty-two Joint Bays** under the paved road.

The impact will be **Moderate Negative** due to the temporary duration of the works, with temporary reinstatement, and permanent reinstatement at the completion of works; the lightly trafficked nature and extent of available capacity on all roads; the supervision of works by a Tipperary County Council engineer; the reinstatement of trenching locations within road pavements in accordance with National and Tipperary County Council requirements.

Damage to Bridges and Culverts

The underground cabling will be installed either in the **road surface over the bridges or by drilling under the bridge and water. Culverts will be crossed by installing cable pipes in concrete over or under the existing culvert. The impact is predicted to be Neutral** because the majority of crossings will require no works to bridges or culverts and any replacement culverts that are needed, will contribute to safer roads and improved infrastructure.

Damage to Road Boundaries at the Site Access point for Mountphilips Substation

The potential for damage to roadside boundaries relates **to the widening of the existing field entrance for the Mountphilips Substation site**. No damage to roadside boundaries will occur at any other location. At the Mountphilips Substation entrance, the existing farm entrance will be widened to 6m, with a clear view in both directions up and down the road for 160m (sightlines). These sightlines will be provided through the partial removal of the roadside boundary and the pruning of any hedgerow or trees that are necessary. This is in accordance with the North Tipperary County Development Plan 2010 (as amended). The **impact is predicted to be Imperceptible** because there is **only one place where road boundaries will be removed** and this **road boundary will be reinstated following construction with the same number of hedgerow and trees set back behind the new substation site entrance**.

15.3.3.2 Effects on the Road Users

Increased Journey Times

The presence of roadworks on the Limerick to Thurles road (R503) and Local Roads around Newport and around the Windfarm Substation; road closures (Local Roads only) and one-lane closures with stop-go systems (Local Roads and R503); and increased traffic due to the construction delivery vehicles on these roads, could result in delays and disruption to road users. **The Impact is predicted to be Slight** because the roads are **already lightly trafficked**; there are **acceptable diversions available around the road closures** on the Local roads; the **maintenance of local access to properties** on the roads, including the roads that will be closed; the **temporary duration** of the works (generally 1 to 3 weeks at any one point on local roads, and 10 to 12 months in total on the main road); the impact will be **gone after reinstatement**; the application **of traffic management measures** and use of flagmen to minimise traffic delays.

15.3.4 Matters evaluated as having No Effect

The following effects were not evaluated in detail as it they were **considered to be Neutral or having no potential or likelihood to occur**: decrease in structural integrity of the roads; increased risk of road accidents; and interrupted/disrupted access to property during construction and operational or decommissioning impacts to public roads and road users.

15.3.5 The cumulative effects

When the effects of UWF Grid Connection on Roads are considered with the effects of UWF Related Works and Upperchurch Windfarm - the summary result is that the **cumulative effects will range from No Potential to Neutral to Imperceptible to Slight and therefore will not be significant.**

15.3.6 Traffic Management Plan

The Traffic Management Plan (TMP) for the public roads will be a key construction contract document, the implementation of which will reduce possible impacts which may occur due to the presence of construction traffic and works on the public roads, in particular the Local Roads in the vicinity. It is a particular objective of this plan to control and minimise the traffic impacts of construction insofar as it may affect the local environment, local residents and the travelling public on the public roads close to and adjacent to the construction site, through measures to maximise the safety while keeping traffic flowing as freely as possible. The TMP will be updated from time to time to include any relevant planning conditions in addition to any new information on 3rd party road works or events, which would impact on the construction traffic route and timing. The appointed Contractor will be responsible for carrying out and managing the construction activities in accordance with the TMP.

The Traffic Management Plan can be found at Tab 2 of the Environmental Management Plan Volume D of the EIA Report.

15.4 Conclusion

The expert who examined this topic concluded that **no significant adverse effects** to Roads (Public Roads and Road Users) will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the **Whole Upperchurch Windfarm Project**.

NTS of Chapter 16: Cultural Heritage (Archaeology)

Cultural Heritage relates to sites of **archaeological, historical or architectural** significance in the form of **sites, monuments, historic structures, artefacts and environmental evidence**.

16.1 How was the Cultural Heritage study carried out?

The study of the effects of the UWF Grid Connection on Cultural Heritage, was carried out by Barry Fitzgibbon and Cóilín O'Drisceoil of Kilkenny Archaeology.

The effects on **Recorded Legally Protected Sites**, **Other Recorded Sites**, **Previously Unrecorded Sites** and **Unrecorded Subsurface Sites** were studied.

Recorded Legally Protected Sites are sites that are listed on the Record of Monuments and Places (called RMP sites) and are protected under the National Monuments Acts (1934-2014). **Other Recorded Sites** are sites listed on the National Inventory of Architectural Heritage (NIAH) and, although not legally protected, they are an important part of Irish architectural heritage. **Previously Unrecorded Sites** are sites that Kilkenny Archaeology have identified during site visits, map investigations and field work, but are unrecorded in the Records of Monuments and Places and therefore do not have legal protection. The majority of these sites are features or ruins of features such as Lime Kilns, Wells, Quarries and Townland Boundaries. Previously **Unrecorded Subsurface Sites** are features or artefacts underground, which have not been discovered yet.

The areas studied for effects **from construction excavations** was set **a) for Recorded Legally Protected Sites** and **Other Recorded Sites** - within the footprint of the construction works area, plus 500m radius surrounding the footprint; **b) for Previously Unrecorded Sites** - within the footprint of construction works areas and extended out to 100m at certain locations which might have archaeological features of importance nearby and; **c) for Unrecorded Subsurface Archaeology** - within the footprint of construction works areas where groundworks will take place.

The **operational effects i.e. landscape or visual effects** were considered for a 2km zone around the location of Mountphilips Substation, which is the only permanent above ground feature of the development.

National and European guidelines on the assessment, protection and conservation of archaeological and architectural heritage have been considered during the preparation of this report and the design of the development.

Sources of information on the area under study, came from **desktop studies** of the Record of Monuments and Places (RMP) and RMP constraints map; Record of Protected Structures; National Inventory of Architectural Heritage; National Museum of Ireland Topographic Files; All editions of the historic Ordnance Survey Maps (including the first edition 1841 and the second edition 1898 1:10560 maps); Other historic mapping, such as the Down Survey (1655) and the Griffith Valuation (1850); and aerial photography mapping of the area – Ordnance Survey, Google and Bing maps. **Field studies** including **walking of the full development works areas** and **test excavations** within the zone of notification for recorded monument a Stone Row (17E173) in Knockcurraghbola Commons.

16.2 Cultural Heritage in the Area

The Slievefelim to Silvermine Mountains upland area is a region with a **rich and diverse history of human settlement going back to prehistoric times**. This extended period of occupation is reflected in the archaeological record. The broader upland landscape has numerous known monuments, recorded on the Record of Monuments and Places. While the spread of these monuments date from **the Neolithic through to post medieval and modern times**, the upland region appears to have been most intensively settled in the late Neolithic, with populations dispersing to the lower slopes during later periods. (the Neolithic times also known as the New Stone Age, is the period which began about 12,000 years ago).

Recorded Legally Protected Sites: There are a total of **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. These comprise the following features Ballaun Stone, Barrows, Boulder Burial, Bawn, Cairn, Castle - Tower House, Children's Burial Ground, Churches, Graveyards, Cists, Cliff- Edge Fort, Earthwork, Font, Enclosure, Fulacht Fiadh, House, Wedge Tombs, Ringforts, Ritual Sites - Holy Wells, Standing Stones and a Stone Row.

In relation to the **Operational Visual** setting for Recorded Legally Protected Sites, there are **four sites** which will have theoretical visibility of the Mountphilips Substation.

None of the RMPs identified, are classed as National Monuments.

Other Recorded Sites: There are a total of **12 Other Recorded sites (mainly National Inventory of Architectural Heritage – NIAH sites) within 2km of the works**, four of which are further than 500m from construction works, but are located within 2km of the Mountphilips Substation. In relation to the Operational Visual setting for Other Recorded Sites, there are 8 which will have theoretical visibility of the Mountphilips Substation.

Previously Unrecorded Sites: Cartographic analysis, aerial photography and a thorough field survey identified a total of 165 Previously Unrecorded Sites within 100m of the construction works. While these were all mapped over the course of this report, only **51 Previously Unrecorded Sites were deemed to have potential significance**, and are included for evaluation.

The majority of the Previously Unrecorded Sites date from the post medieval or early modern periods and reflect a wide variety of human rural activity. The sites mainly comprised of Lime Kilns, Wells, Quarries and Townland Boundaries, which may not have ever had any structural elements associated with them or are no longer standing.

Unrecorded Subsurface Sites: As this type of archaeology is currently undiscovered, they cannot be particularly described in this report. Because the Mountphilips Substation site has been subject to intensive agriculture and the cabling is almost wholly along the public road, it is considered that any **Unrecorded Subsurface Sites** exposed during the course of construction ground works would most likely be **levelled earthworks, back filled ditches or slot trenches** cut directly into the natural subsoil, or areas of large scale burning such as you might find at a **Fulacht Fiadh** site. There is also the possibility for other site types being exposed, including (but not limited to) **artefact scatters**, objects such as **pottery, stone and bronze axes**, **foundations of buried structures, burials, and trackways**.

16.3 What possible effects on Cultural Heritage were studied?

Archaeological sites could be **affected by any groundworks** which would partially or wholly damage the site itself or features/objects associated with the site or which may damage any associated underground features or structures which are no longer visible.

Townland boundaries can be **affected by groundworks**. Modern townland boundaries can have origins going back to the medieval period or earlier, where they might have acted as extents for manors or ancient landholdings. As such, any associated structures or ditches may contain archaeologically significant material which could be damaged or removed during groundworks.

Also, some archaeological sites or monuments were most likely deliberately constructed in specific locations **to take advantage of views of the surrounding landscape, celestial events or other monuments**. As such the 'views of and from' these sites are an integral part of the monument's character and could be **affected by the presence of new structures** in the locality.

Therefore the possibility for these effects were studied.

16.3.1 Measures to avoid, prevent or reduce negative Effects to Cultural Heritage

The design of the development includes for the **archaeological monitoring of all initial ground works within 500m of an RMP or NIAH site during the construction stage and where excavations occur at culvert replacement locations along the underground cable route and at the 3 No. new watercourse crossing at the Mountphilips Substation site, excavations will be monitored by an appropriately qualified archaeologist under license from the National Monuments Service.** This will allow for an onsite archaeologist, under license from the National Monuments Service, to archaeologically record and preserve, either leaving it in the ground or by record, any structures, features or objects of archaeological significance which may be encountered during the works.

16.3.2 The Effects of UWF Grid Connection

16.3.2.1 Recorded Legally Protected Sites

There will be **No visual Impact** to Recorded Legally Protected Sites because, although four sites are theoretically visible from the Mountphilips Substation, the results of drone surveys, carried out by the authors of the Landscape chapter, demonstrates that the **surrounding vegetation combined with the low lying location of the substation, will screen the new substation completely from view** from all of these four sites.

16.3.2.2 Other Recorded Sites

There is **no potential for complete or partial destruction** of Other Recorded Sites from groundworks for the development due to separation distance from ten of the twelve sites. Of the other two sites – 1) Mountphilips Demense: has no existing features, it has been absorbed into the modern agricultural landscape in the area and 2) Anglesey Bridge: there will be no interaction with the columns or supporting structures of the bridge.

There is **no potential for visual impact** from Mountphilips Substation with seven of the theoretically visible sites, due to vegetation and topography. There is intervisibility with the eight site - Mountphilips Demense but there is no potential for impacts because, as stated at 16.3.2.1 above, there are no features of this site remaining.

16.3.2.3 Previously Unrecorded Sites

Damage to townland boundaries will only happen 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 road to the Substation compound. **The Impact will be Imperceptible** because the damage will be limited to two small sections of boundary and during the field inspection there was no sign of features of archaeological significance associated with these boundaries; all of the townland boundaries in the area have been subject to continuous alterations, demolition and removal as a result of housing, agriculture and forestry in recent times and; there will be an archaeologist on-site monitoring of all ground works, within 500m of an RMP or NIAH site.

16.3.2.4 Unrecorded Subsurface Sites

The potential impact of complete or partial destruction of unrecorded subsurface sites will be Slight because the cabling is located almost wholly within public roads and the dominant land uses in the area, agriculture and forestry and public roads, means that it will be unlikely that any fully intact remains of special archaeological significance will be uncovered at this stage. Any finds will likely include only levelled earthworks, backfilled cuts, and areas of large scale burning or artefact scatters. Also, all initial groundworks within 500m of an RMP or NIAH site, will be monitored by an on-site archaeologist, under license.

16.3.3 Matters evaluated as having No Effect

Recorded Legally Protected Sites: Complete or partial destruction due to groundworks - These are not likely to be damaged by groundworks to Recorded Legally Protected Sites due to the distance of these sites from the construction works areas, which are located outside the Zone of Notification for three of the 39 RMP sites within 500m of the works. The location of the works in close proximity to three RMP sites only involves cabling in the Regional Road and therefore there will be no interaction with the three sites.

Other Recorded Sites: See above at Section 16.3.2.2

Previously Unrecorded Sites: Complete or partial destruction due to groundworks of Previously Unrecorded Sites (except townland boundaries) - The underground cabling crosses two fords, but the cabling will be drilled under the existing bridges at these locations and no impacts are likely to occur. Thirteen culverts along the Anglesey Road will also be crossed, which may require replacement, however damage to sites is not likely to occur due to distance from known sites and the monitoring of groundworks within 500m of an RMP or NIAH site.

Visual impacts - There is no potential for visual impacts as drone surveys demonstrated that there will be no visibility of the Mountphilips Substation from Recorded Sites.

Unrecorded Subsurface Sites: Visual impacts - It is unlikely that a monument will be uncovered during construction works, rather that small artefacts, levelled earthworks or backfilled cuts are likely to be uncovered. These types of archaeology are not likely to be sensitive to visual effects.

16.3.4 The cumulative effects

When the effects of UWF Grid Connection on Cultural Heritage are considered with the effects of UWF Related Works, Upperchurch Windfarm, Milestone Windfarm, Foilnaman Mast and Cummermore Communications Pole - the summary result **is that the cumulative effects will range from No Potential to Imperceptible to Slight and therefore will not be significant.**

16.4 Conclusion

The experts who examined this topic concluded that **no significant adverse effects** to Cultural Heritage will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project, or cumulatively with other projects.

NTS of Chapter 17: Landscape

Landscape is an Area perceived by People, whose character is the result of the action and interaction of natural and/or human factors. Landscape is about the relationship between people and place and provides the setting for our day-to-day lives.

17.1 How was the Landscape study carried out?

The study of the effects on Landscape, was carried out by Richard Barker of Macroworks (Landscape architect).

Landscape Character is the landscape patterns and setting that give each locality its 'sense of place', making one landscape different from another. The effects on Landscape Character are studied.

Visual Amenity is the elements that contribute to landscape character such as designated views and scenic routes; views of pastoral landscape; and views of archaeological interest. The effects on Visual Amenity are studied.

Industry guidelines on the assessment of landscape and visual impacts have been considered during the preparation of the evaluation of Landscape in the area.

Sources of information on the area under study came from a review of **North Tipperary County Development Plan, including the Landscape Character Assessment of Tipperary 2016;** the National Landscape Strategy for Ireland (2015-2025); and Chapter 6 - to establish the extent of tourism and amenity features in the area**. Field studies** including site visit, drone surveys and photographs of the area around Mountphilips Substation and along the underground cable route.

A photomontage was created to show what the new substation will look like from the Local Road at Coole - Figure NTS 4: Photomontage of the new Mountphilips Substation at the back of this volume. The first picture in the photomontage **shows the shape of the substation behind the vegetation and landform** and the second picture shows what will actually be seen from the Local Road at Coole.

17.2 The Landscape setting for the development

17.2.1 The Landscape Character of the Area

Mountphilips Substation, along with the westernmost 10km of the underground cable is located in a **traditional farming landscape within gently rolling terrain of fields and hedgerows**. The area around Newport is more densely populated and the land is farmed more intensively than in the upland area, east towards Thurles. The remaining 20km of the **underground cabling** will be contained within the **upland rural background of the Slievefelim to Silvermine Mountains** which has a relatively **tranquil upland rural landscape character of low intensity agriculture**, including grassland and forestry, with a sparse and dispersed population.

17.2.2 The Visual Amenities of the Area

The underground cabling **along the Limerick to Thurles road** will coincide with a **designated scenic route** as set out in the North Tipperary County Development Plan. The main, amenity and heritage assets within the area are a **way-marked walking trail, the Slieve Felim Way and a cycle trail, the Ormond Way cycle route**. The 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. **Wind energy developments on upper slopes and ridges within the south and southeast** of the Slievefelim to Silvermine Mountain upland area, can be seen intermittently in the distance throughout the area.

Views of the gently rolling lowland landscape of fields and hedgerows at the Mountphilips end of the development, have something of a traditional farming feel and tend to be less wide open views because of landform and hedgerows.

17.3 What possible effects on Landscape were studied?

Landscape Character can be affected by changes to land cover and land cover patterns, increases in activity which can cause a reduction in rural tranquillity or the introduction of new buildings.

Visual Amenity can be affected by the permanent blocking of open views or permanent visual change by the introduction of new buildings that take from local views.

Therefore these effects were studied.

17.3.1 Measures to avoid, prevent or reduce negative Effects to Landscape

To reduce the intensity of construction activities, **construction and construction delivery schedules** for all of the elements of the Whole Upperchurch Windfarm Project in the **Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons area, will be timed so that they don't happen at the same time**.

17.3.2 The Effects of UWF Grid Connection

17.3.2.1 Landscape Character

Alteration or division of land cover and vegetation patterns: The potential for alteration or disturbance of land cover or vegetation patterns will only happen at the Mountphilips Substation site, and this impact will not occur outside of the substation site because the underground cabling is located within road pavements, where no alteration or disturbance of land cover or vegetation patterns can occur. In total 4.6 hectares of construction works areas will be carried out in the open countryside at the Mountphilips Substation site and the impact will be **Imperceptible because there is plenty of that type landscape in the area and the substation site is not unusual locally.**

Intensification of activity causing a reduction in rural tranquillity: Given the **small extent and screening by landform and hedgerows of Mountphilips Substation works** and the **small scale, and passing nature of the cable trenching works on the public roads**; the temporary duration of construction activities and the reversibility of effects once temporary construction areas along the road are reinstated, the **impact will be Slight to Imperceptible.**

Intensification of built development and reduction in the integrity of rural landscape pattern: The **only permanent feature above ground will be the Mountphilips Substation**, which will have a minor, but permanent impact on the rural landscape pattern of the location and immediate surrounds. However, it is not readily visible from surrounding roads and residences, which limits the impacts on landscape character. The impact will be **Slight to Imperceptible**.

17.3.2.2 Visual Amenity

Intensification of activity causing visual disharmony, clutter or complexity: **There will be an intensification of activity during the construction stage**, due to traffic and working machinery. The greatest intensity and duration of visible construction related activity, will occur at the **Mountphilips substation site**, which also includes a temporary construction compound that will provide office, welfare, storage and parking facilities to construction workers. There will also be construction activity with machinery, vehicles and people at the underground cabling sites along the public roads.

The Mountphilips site is well screened by landform and hedgerows, which will restrict the extent to which construction activity can be seen from the surrounding landscape. **Visible construction activity for the underground cable will be dispersed** over a large area at multiple small, independent sections of the cable route on the public road. The impact will be **Slight to Imperceptible**.

Addition of new features/loss of existing features causing visual disharmony, clutter or complexity: Following construction, when the development is operating, the **new substation at Mountphilips will be an additional built feature** in the rural landscape. However the s**ubstation is substantially screened from view by high ground and high field and roadside hedgerows** – See Figure NTS 4: Photomontage of the new Mountphilips Substation at the back of this document for the visual effect from the surrounding landscape. The **underground cable**, almost wholly under the public road, **will have negligible effects on visual amenity** because the only visible part of the cabling after construction and road reinstatement will be **man-hole covers at the Joint Bays and safety markers**. The impact will be **Imperceptible**.

17.3.3 Matters evaluated as having No Effect

The effect of **Intensification of activity around the development during the Operational Stage** was not evaluated in detail, because the effect was considered to be **Neutral**.

17.3.4 The cumulative effects

When the effects of UWF Grid Connection on Landscape are considered with the effects of UWF Related Works, UWF Replacement Forestry, Upperchurch Windfarm, Milestone Windfarm, Foilnaman Mast, Cummermore Communications Pole, Forestry and Agricultural activities in the surrounding area – the summary result **is that the cumulative effects will range from Imperceptible to Not Significant to Slight.**

17.4 Conclusion

The experts who examined this topic concluded that **no significant adverse effects** to Landscape will occur as a result of the UWF Grid Connection on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project, or cumulatively with other projects or activities.

NTS of Chapter 18: Interaction of the Foregoing

In the application reports, all the required Environmental Factors are examined. These are **Population & Human Health**; **Biodiversity** (plants and animals); **Land; Soils**; **Water**; **Air** (air quality, noise, vibration and electromagnetic fields); **Climate**; **Material Assets** including **Built Services** (electricity network, communication network, water supply infrastructure**)** and **Roads**; **Cultural Heritage** (archaeology) and **Landscape**. Each Factor has a dedicated chapter.

Any interaction between these Environmental Factors is called a **cross factor effect**. A cross factor effect happens when the effect on one Environmental Factor causes an indirect effect on another environmental factor – e.g. excavation to **Soils** causing run-off of soils into a drain or watercourse which then causes an indirect effect to **Water** quality.

Likely cross factor effects were examined in the environmental factor topic chapters. **In summary there are no effects on one Environmental Factor likely to cause significant cross factor effects on another Environmental Factor.**

NTS of Chapter 19: Mitigation Measures & Monitoring Arrangements

The Project Promoter is **committed to building and operating the UWF Grid Connection without causing significant negative effects on the environment**.

To achieve this, **Environmental Commitments** have been developed during both the design stage of the project and the examination of effects on sensitive aspects in the environment.

The Environmental Commitments are made up of Project Design Measures (**Mitigation Measures**), Best Practice Measures and Management Plans. These measures and plans are listed in full in Volume D: UWF Grid Connection Environmental Management Plan.

The Project Promoter will **contractually oblige the construction contractors to carry out the works in accordance with all of the Environmental Commitments**. Compliance by the contractors with the Environmental Commitments will be **monitored** on the ground by a full time **Environmental Clerk of Works and team of environmental experts**.

NTS of Chapter 20: Non-Technical Summary Conclusion

This planning application, UWF Grid Connection is a development proposed for an area in County Tipperary, generally between Newport town and Upperchurch village. The development comprises the following elements:

- A **new electrical substation in Mountphilips, near Newport**, connected to the nearby existing Killonan to Nenagh overhead electricity line. The new substation will be built in a grass field, just under the existing electricity line.
- **approx.30km in length of underground electrical cable**, starting at the new substation in Mountphilips and going to Upperchurch Windfarm substation in **Knockcurraghbola Commons, near Upperchurch**. The grid connection cabling will be undergrounded in the public road from the entrance to new substation in Mountphilips, under Local Roads around Newport Town, joining the Limerick to Thurles road at the GAA grounds outside of Newport Town, under the main road for 22km until the turn off for the Borrisoleigh Road at Knockmaroe, and then under Local Roads and a paved private road to the site of the Upperchurch Windfarm Substation.

Upperchurch Windfarm and substation are not built yet. Planning permission was granted in August 2014 for twenty two wind turbines and an electrical substation.

The purpose of this application - UWF Grid Connection - is to connect Upperchurch Windfarm substation to the National Grid by building an underground cable from the windfarm to a new substation to be built at Mountphilips townland, under an existing overhead electricity line and connecting the new substation, to that line. These works will enable the **export of electricity to the National Grid, from Upperchurch Windfarm when the windfarm is constructed and operating**.

This EIA Report has been prepared by a team of experts. The experts examined the effects of the UWF Grid Connection on the environmental factors and have concluded that **no significant adverse effects will occur to the environment or human health as a result of building or operating UWF Grid Connection**, either on its own, or cumulatively as part of the Whole Upperchurch Windfarm Project, or along with other projects or activities like other windfarms and local agricultural or forestry activities in the surrounding area. This is generally because the sub-station is proposed for an area far from houses in a grass field and the cabling back to the Windfarm will be under the public road and will cross water at existing structures (Bridges & Culverts).

While the **UWF Grid Connection will not generate renewable electricity itself**, it will enable **Upperchurch Windfarm to export renewable electricity to the National Grid** which, together with the other operational windfarms in Ireland, will have a **significant positive effect on Ireland's commitment to tackling Climate change.**

This UWF Grid Connection EIA Report and all other application documents are available for public viewing at the offices of An Bord Pleanála, the offices of Tipperary County Council, and on-line at

www.upperchurchwindfarmgridconnection.ie.