UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 12: Air

October 2019

Topic Air

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

List of Abbreviations

Abbreviation	Full Term
AIMD	Active Implantable Medical Devices, such as Pacemakers
BPM	Ecopower Best Practice Measure developed by members of the EIAR Team
dB	Decibel - The unit of sound pressure level
EMF	Electromagnetic Fields, Comprising of Electric and Magnetic Field.
HDV	Heavy Duty Vehicle with a gross weight greater than 3.5 tonnes
IAQM	Institute of Air Quality Management
ICNIRP	International Commission on Non-Ionising Radiation Protection
NHA	National Heritage Area
OHL	Overhead Power Line, mounted on wooden poles or pylons

Abbreviation	Full Term
PD	Ecopower Project Design Environmental Protection Measure
PM	Abbreviation for particulate matter suspended in the air. PM10 is airborne particulate matter with an aerodynamic diameter less than 10 microns (µm); PM2.5 is less than 2.5µm
SAC	Special Area of Conservation
SPA	Special Protection Area
TII	Transport Infrastructure Ireland
V/m, or kV/m	Electric Field is measured in Volts per metre, V/m, or kV/m (1000 V/m)
µT	Magnetic Field is measured in micro Tesla , µT
UGC	Underground Cables
UWF	Upperchurch Windfarm

Glossary of Terms

Term	Definition
Ambient Sound	The total amount of all noise present at a particular place and time in the environment at the point of investigation
Attenuation	The reduction of sound energy by a variety of means such as air, humidity, porous materials, distance etc.
Average Noise Level (LAeq, Leq)	This is the energy average noise level considered as a notional steady level that contains the same amount of noise as the actual fluctuating noise level during a specified period of time (based on equal energy principal) expressed as LAeq sometimes as Leq
Decibel or dB	The unit of sound pressure level usually abbreviated to the dB. Any noise quantity that is expressed as a level is measured and quoted in decibels
EMF Immunity	The robustness of an electrical/electronic device to EMF interference and maintain correct operation.
Equipment Interference	Electrical/electronic device failing to maintain correct operation due to EMF levels
Noise Level	For sound transmitted primarily through the air it is usually taken to be the A weighted sound pressure level
Maximum Noise Level	This is the highest instantaneous sound pressure level in decibels with a specified frequency weighting and time weighting, expressed as LAFMax and sometimes referred to as the LMax
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Substation	Part of the Electrical Grid system, transform Voltage to higher or lower and perform several other functions
Trackout	The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site

Term	Definition
V/m, or kV/m	Electric Field is measured in Volts per metre, V/m, or kV/m (1000 V/m)
µT	Magnetic Field is measured in micro Tesla , µT

Executive Summary to the Air Chapter

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

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

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

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

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

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

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

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

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

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

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

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

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

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

12 Environmental Factor: Air

12.1 Introduction to the Air Chapter

12.1.1 What is Air?

In this EIAR, Air relates to air quality, ambient noise and vibration and electromagnetic Fields.

Air quality relates to the quality of air in our environment, and can be adversely affected by emissions of various pollutants. In terms of this chapter, nitrogen oxides (NO + NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) are the two main air pollutants of concern. Poor air quality can impact human health, vegetation and ecosystems. Ireland in general has a good standard of air quality compared with other European countries.

Airborne noise is energy propagated through the air via pressure fluctuations which are detected by the ear. Vibration relates to energy propagated through either the air or the ground.

Electromagnetic Fields (EMF) comprise an electric field and a magnetic field, and are emitted from both natural and unnatural sources in the environment.

12.1.2 Overview of Air in the Local Environment

In general terms the project is located in predominantly rural areas and away from major urban areas or large centres of population. The surrounding landscape is predominantly rural, agricultural grassland and forestry. Nearby settlements include the town of Newport, and the villages of Upperchurch, Kilcommon, while the 110kV UGC is routed through the village of Rear Cross. With the exception of the Newport area, the area is sparsely populated with individual dwellings and farmsteads scattered throughout this rural area.

There are a number of Designated Sites in the area including the Slievefelim to Silvermines SPA and the Lower River Shannon SAC. There are also a number of waymarked trails in the area – including the Slievefelim Way and the Ormond Way cycle route.

There is a high level of air quality in this upland area, as it is located away from busy, congested roads and industrial sources of air pollutants.

The existing noise sources are typical for such a rural/ agricultural setting, dominated by natural noise sources, mainly wind borne noise, but also running water and birdsong. There are also man-made noise sources in rural areas including farm machinery when in operation, and from traffic in and around Newport town and from traffic on the public road network, including the R503 road which is a regional road connecting Thurles to Newport and Limerick City.

Sources of EMF in the existing environment include electric equipment, and low, medium and high voltage overhead electricity lines, overhead telephone lines, signals from existing telecommunications masts and underground communication cables which run along road boundaries and across agricultural lands.

The location of the UWF Grid Connection is illustrated on OSI Mapping on Figure GC 12.1: Location of the UWF Grid Connection.

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

12.1.3 Sensitive Aspects of the Air Environment included for further evaluation

Any sensitive receptor in the local environment which could be impacted by the project is a Sensitive Aspect. The following Sensitive Aspects **are included in this topic chapter** as they could be potentially impacted:

Sensitive Aspect No. 1	Local Residents & Community	Section 12.2
Sensitive Aspect No. 2	Transient People	Section 12.3

Each of the above listed Sensitive Aspects are evaluated individually in Sections 12.2 to 12.3 of this Chapter.

To help readers navigate to individual sensitive aspect sections, the colour codes for each Sensitive Aspect used above are also used in the Sensitive Aspect sections Section 12.2 to 12.3. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

12.1.4 Sensitive Aspects excluded from further evaluation

The following Sensitive Aspects **are excluded from this topic chapter**:

Telecommunications Infrastructure *(Telecommunication equipment on local masts and local signal paths between tele-communication masts)*	Evaluated as excluded in this Air chapter: Evaluated in Chapter 14: Built Services. The levels of EMF associated with the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm and the potential for EMF to effect local communication networks have been a subject of discussion between Kevin Hayes of Ai Bridges, one of the authors of Ch.14 Material Assets (Built Services) and Lewis Brien, one of the authors of this topic chapter Air, where it was decided that in order to avoid duplication of information in this EIA Report, that the this type of impact pathway would be evaluated in Chapter 14: Material Assets (Built Services). The results of the evaluation in Chapter 14, is that the development is not likely to adversely affect local communication networks.
Sensitive Ecological Receptors	Evaluated as excluded in this Air chapter: Evaluated in Chapter 8: Biodiversity. To avoid duplication of information in this EIA Report, information on the emission of dust, noise, vibration and EMF was provided by the authors of this chapter Air to the authors of the Biodiversity Chapter. The authors of the Biodiversity chapter have taken these emissions into account in their evaluations of impacts to ecological receptors.

12.1.5 Overview of the Subject Development

The UWF Grid Connection is the subject development, being the subject of a current application to An Bord Pleanála. The main parts of the UWF Grid Connection are identified in Table 12-1 below.

Table 12-1: Subject Development – UWF Grid Connection

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

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

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

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

12.1.5.1 Changes to the development from the 2018 Application

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

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

12.1.6 The Authors of the Air Chapter

This report on the Environmental Factor Air, was written by a number of authors.

The Air Quality sections have been written by Ciara Nolan, BSc (Hons) in Energy Systems Engineering and Master in Applied Environmental Science, of AWN Consulting Ltd. She is an Associate Member of the Institute of Air Quality Management and specialises in the fields of ambient and indoor air quality monitoring and EIA. AWN Consulting is a multidisciplinary environmental consultancy specialising in Acoustics, Air Quality, Climate, Waste, Water and Soil Quality, Flora and Fauna and Seveso II Major Accident Hazard Land Use Assessments.

The noise and vibration sections have been written by Peter Barry (BAgr Sc. MSc) of Enovi. Peter is an Environmental Scientist, Environmental Noise Specialist and Environmental Impact Assessment practitioner. Peter has 20 years-experience in the measurement, prediction, assessment and control of environmental noise. Peter is a member of the Institute of Acoustics (IOA) and has undertaken numerous wind farm and associated infrastructure noise impact assessments across the country.

The Electromagnetic Fields sections have been written by John McAuley (MSc (Hons) in Engineering) and Lewis Brien (B (Hons) in Electronics) of Compliance Engineering Ireland (CEI). CEI has carried out over 500 radiofrequency site surveys throughout Ireland and worldwide and is recognised by Comreg as one of the foremost independent authorities on the radio frequency spectrum in Ireland.

12.1.7 Sources of Baseline Information

The information sources outlined in Table 12-2 were reviewed during desktop studies and confirmed during fieldwork in order to gather information on the baseline environment. The recommendations in the guidelines listed in the table, have been considered during the preparation of this chapter.

Table 12-2: Sources of Baseline Information for Air

Type	Source
Consultation	Feedback was received from • Health Service Executive • Members of the public during the Public Consultation and Information Day See Chapter 3: The Scoping Consultations, Chapter 3 Appendices for further details.
Legislation, Regulation & Policy	• EU Directive 2008/50/EC - Air quality standards were established under which sets limit values for certain air pollutants in order to protect against human health impacts. • Environmental Noise Directive (END), EC 2002/49/EC • European Commission (EC) "Electromagnetic Compatibility Directive 2014/30/EU" • European Commission (EC) "Radio and Telecommunications Equipment Directive 1999/5/EC" • S. I. No. 109 of 2007, European Communities (Electromagnetic Compatibility) Regulations 2007. • S. I. No. 240 of 2001, European Communities (Radio and Telecommunications Terminal Equipment) Regulations 2001.
Industry Guidance	• Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII, 2011) • Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014) • Environmental Protection Agency – Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), 2016. • NRA Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004) • Transport Infrastructure Ireland "Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, March 2014" • Institute of Environmental Management and Assessment (IEMA) - Guidelines for Environmental Noise Impact Assessment, 2014. • British Standard 5228 Parts 1 & 2, Code of Practice for Noise and Vibration Control on Construction and Open Sites + A1 2014. • ISO 9613-2-1996- Acoustics – Attenuation of sound during propagation outdoors –Part 2: General method of calculation, • ICNIRP Guidelines For Limiting Exposure To Time-Varying Electric And Magnetic Fields (1Hz – 100 kHz) (2010) • EU EMF recommendation 1999/519/EC. • European Committee for Electrotechnical Standardization (CENELEC), "EN 45502-2-1:2003 Active implantable medical devices. Particular requirements for active implantable medical devices intended to treat bradyarrhythmia (cardiac pacemakers)
Desktop	• EPA "Air Quality Monitoring Report 2017" (EPA, 2018), • EPA Annual Air Quality Monitoring Reports (2010 - 2016) • Review of aerial photography, and OSI and other online mapping to identify local residential properties, local community facilities and walking routes and to identify other activities in close proximity to these properties and routes • AC Field Modelling of the fields from the works • Comreg, ESB and Radiological Protection Institute of Ireland online Information • Review of the following EIA Report chapters: Chapter 10: Soils, Chapter 15: Material Assets: Roads • Review of planning/ environmental information documents for the Other Elements of the Whole UWF Project as contained in Volume F of the planning application

Type	Source
Fieldwork	• Site visits to establish the proximity of nearby sensitive receptors to the works areas. • Representative noise measurement undertaken at a similar substation to the Mountphilips Sub-station for the purposes of the evaluation. • Baseline Noise Measurements at the nearest noise sensitive receptor to the Mountphilips substation location

12.1.8 Methodology used to Describe the Baseline Environment and to Evaluate Impacts

UWF Grid Connection can impact local air through a number of mechanisms: traffic based air pollutants, construction dust emissions, noise or vibration emissions, and electromagnetic fields. The methodology for evaluating the effects of traffic, dust noise, vibration and EMF emissions is provided in the Sections below.

12.1.8.1 Methodology for Evaluating Effects to Air Quality

12.1.8.1.1 Air Quality Standards

Air quality is evaluated against the Air Quality Standards set out by the EU. Air Quality Standards were established under EU Directive 2008/50/EC which sets limit values for certain air pollutants in order to protect against human health and ecological impacts. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors, such as natural background levels, environmental conditions and socio-economic factors, may be considered. The limit values are presented in the table below.

Table 12-3: EU Air Quality Standards Regulations

Pollutant	Regulation[1]	Limit Type	Value
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
$PM_{2.5}$	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3 NO_2
		Annual limit for protection of human health	40 µg/m^3 NO_2
		Critical Load for protection of vegetation	30 µg/m^3 NO + NO_2

12.1.8.1.2 Transport Infrastructure Ireland Guidance on Traffic based air pollutants

The UK DMRB guidance, on which Transport Infrastructure Ireland (TII) guidance document '*Guidelines on the Treatment of Air Quality During the Planning and Construction of National Road Schemes*' was based, states that road links[2] meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment.

Neither the subject development nor the whole project meet any of the criteria listed in Table 12-4, and as a result a local air quality assessment was not required.

[1] Based on EU Directive 2008/50/EC

[2] A road link is where the existing road network is broken up into sections of road with similar traffic conditions (traffic composition, speed and flow).

Table 12-4: UK DMRB Criteria for Air Quality Assessment

TII Criteria	Criteria met?
Road alignment change of 5 meters or more	No, no change in road alignments
Daily traffic flow changes by 1,000 Annual Average Daily Traffic (AADT) or more	No, changes to daily traffic substantially below 1000 Annual Average Daily Traffic (AADT)
HGVs flows change by 200 vehicles per day or more	No, HGV flow changes substantially below 200 vehicles/day
Daily average speed changes by 10 km/h or more	No, no change in average speed
Peak hour speed changes by 20 km/h or more	No, no change in peak hour speed

12.1.8.1.3 IAQM Guidance on Construction Dust Emissions

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' outlines an assessment method for predicting the impact of dust emissions from earthworks, construction and haulage activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase in order to predict the likely magnitude of the dust impacts on sensitive receptors.

12.1.8.1.4 IAQM Guidance on identifying Sensitive Receptors

The IAQM Guidance states that an assessment of dust impacts will be required where there is a 'human receptor' within 350 m of the boundary of the works or within 50 m of routes used by construction vehicles. According to the IAQM Guidance **a 'human receptor'** refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling[3], or exposure to PM_{10} over a time period relevant to the air quality objectives. The criteria for determining the sensitivity of a receptor to effects from dust is outlined in the Table below.

Table 12-5: IAQM Criteria for determining the sensitivity of a receptor to dust impacts

Sensitivity of a Human Receptor to Dust soiling	
High	locations where users can expect enjoyment of a high level of amenity
	appearance, aesthetics, value of property diminished by soiling
	people or property present either continuously or for extended periods of time
Medium	locations where users expect to enjoy a reasonable level of amenity
	appearance, aesthetics, value of property diminished by soiling
	people or property not present continuously or regularly for extended periods of time
Low	locations where enjoyment of amenity is not reasonably expected
	property not expected to be diminished in appearance, aesthetics, value by soiling
	areas of transient exposure where people or property are passing through or by an area
Sensitivity of a Human Receptor to health impacts from PM_{10}	
High	Areas where people are exposed over a time period relevant to the air quality objective for PM_{10} (Air Quality Standards established under Directive 2008/50/EC are reproduced in Table 1 of Appendix 12.1: Air Quality Monitoring & Standards.)
Medium	locations where the people exposed are workers
Low	locations where human exposure is transient

[3] As Per IAQM guidance 2014: Occupational settings are relevant in terms of annoyance effects.

12.1.8.1.5 IAQM Guidance on Evaluating the Sensitivity of the Area

According to IAQM Guidance (2014), the sensitivity of an area to construction dust impacts from either dust soiling or health impacts from PM_{10} is assessed using the criteria outlined in Table 12-6 to Table 12-7. This is based on the sensitivity of the receptor, the number of receptors and their distance from the dust source.

With regards to the sensitivity of the area a 'worst-case' approach has been taken in this assessment whereby the area with the majority of sensitive receptors within the closest distance to the works area have been assessed. This will establish the highest possible level of risk associated with any element of the project for either dust soiling or health impacts from PM_{10}; then the appropriate level of mitigation or best practice measures can be established if necessary, based on a high, medium or low level of risk.

Table 12-6: Sensitivity of an area to dust soiling effects on people and property (in bold)

Receptor Sensitivity	**Number of Receptors**	**Distance from the Source (m)**			
		less than 20	**less than 50**	**less than 100**	**less than 350**
High	greater than 100	High	High	Medium	Low
	10 - 100	High	**Medium**	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	1 or more	Medium	Low	Low	Low
Low	1 or more	Low	Low	Low	Low

(Note: The sensitivity of the area to dust soils effects are identified in bold text with yellow background)

Table 12-7: Sensitivity of an area to human health impacts

Receptor Sensitivity	**Annual Mean PM_{10} concentration**	**Number of Receptors**	**Distance from the Source (m)**				
			less than 20	**less than 50**	**less than 100**	**less than 200**	**less than 350**
High	less than 24 µg/m^3	greater than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	**Low**	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	less than 24 µg/m^3	greater than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	less than 24 µg/m^3	1 or more	Low	Low	Low	Low	Low

(Note: The sensitivity of the area to dust soils effects are identified in bold text with yellow background)

12.1.8.1.6 IAQM Guidance on Evaluating the Magnitude of Dust Emissions

Earthworks will primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- Large: Total site area > 10,000 m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;
- Medium: Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8 m in height, total material moved 20,000 – 100,000 tonnes;
- Small: Total site area < 2,500 m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earth-works during wetter months.

The worst case classification for dust emission magnitude (earthworks) can be classified as large as worst case for UWF Grid Connection.

Construction Material: Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- Large: Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;
- Medium: Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. con-crete), on-site concrete batching;
- Small: Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The worst case classification for dust emission magnitude (construction material) can be classified as medium for UWF Grid Connection.

Trackout: In relation to trackout, factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- Large: > 50 HGV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;
- Medium: 10 - 50 HGV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m;
- Small: < 10 HGV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

The worst case classification for dust emission magnitude (trackout) can be classified as medium for UWF Grid Connection.

12.1.8.1.7 IAQM Guidance on Evaluating the Risk of Dust Impacts

The sensitivity of the area is combined with the dust emission magnitude to define the risk of dust impacts in the absence of mitigation, as outlined in Table 12-8.

Table 12-8: Risk of Dust Impacts in relation to earthworks, construction works and trackout

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk – earthworks/construction *or* Low Risk - trackout	Low Risk – earthworks/construction *or* Negligible - trackout
Low	Low Risk	Low Risk	Negligible

The worst case risks of dust impacts in relation to earthworks, construction materials and trackout can be classified as medium in relation to the UWF Grid Connection construction works.

Relevant Appendix: Volume EIAR C4: EIAR Appendices
Appendix 12.1: Air Quality Monitoring & Standards

12.1.8.2 Methodology for Evaluating Noise & Vibration Effects

12.1.8.2.1 Identifying Noise Sensitive Receptors

A noise sensitive receptor is defined by the Environmental Protection Agency as, *any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.*

12.1.8.2.2 Construction Stage Noise Predictions

The potential for construction stage noise impacts mainly relates to the construction of the 110kV UGC. There are no extraordinary sources of noise amongst the equipment to be used, and the works will generally proceed linearly and during normal working hours.

The main item of plant which will be used for the excavation of the 110kV UGC trench and Joint Bay locations will be an excavator. This is a piece of machinery with similar noise emissions to an agricultural tractor, which are commonplace in the area. Noise emissions for a 30 to 50 tonne tracked excavator is 79dB at 10m. This data is sourced from the British Standard 5228, Code of Practice for noise and vibration control on construction and open sites. Plant and machinery typically involved in substation and underground construction activities is listed in the table below. Noise levels, sourced from BS5228 Noise Database for Noise and Vibration Control on Construction and Open Site 1& 2: 2014+A1, are also included in the table.

Table 12-9: Typical Construction Plant and Machinery which will be used during the Construction Stage

Plant and Machinery	Octave Banding (Hz)								Sound Power Level dB(A)	Sound Pressure Level @10mdB(A)
	63	125	250	500	1k	2k	4k	8k		
Telescopic Handler	86.8	86.9	85.4	92.8	98	96.2	88	78.9	102	71
Mobile Crane	84.8	90.9	93.4	90.8	95.0	95.2	88.0	79.9	101	70
30-50T Excavator	89.8	92.9	99.4	104.8	104	103.2	100	92.9	110	79
15-30T Excavator	99.8	98.9	104.1	100.8	101	100.2	96	86.9	109	78
12T Roller	94.8	98.9	99.4	108.8	104	100.2	97	90.9	111	80
Rigid truck	89.8	94.9	99.4	98.8	105	102.2	97	87.9	109	78
Tractor & Trailer	97.8	100.9	98.4	103.8	104	104.2	96	88.9	110	79
15-20T Rubber Tired Excavator	78.8	80.9	86.4	91.8	94	92.2	91	79.9	99	68
3-10T mini digger	85.8	86.9	90.4	90	95.0	90	92	84.9	100	69
Diesel Generator	84.8	88.9	79.4	81.8	84	80.2	77	66.9	92	61

The decibel sum of all of the items of plant listed above totals 86 dBA at 10 metres.

The construction works will be sequenced and all the noise sources presented in Table 12-9 will not be in operation continuously for the duration of the construction phase, and likely noise levels will be in the order of the excavator, i.e. 79dB at 10m.

Calculating the Spatial Extent of Noise

Using the inverse square law rule (In decibel terms a doubling (or halving) of sound intensity corresponds to an increase (or reduction) of 6dB), the sound pressure level, or magnitude of noise impact for both the Worst Case Noise levels (all plant in operation in the same location at the same time) and the Realistic Noise Levels, can be determined. The results are presented in Table 3, at increasing distances from the works. The

appropriate construction noise threshold levels (as per NRA *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (2004), are also included in Table 3.

Table 1 Determining Worst-Case and Realistic-Case Noise Levels

Distance from noise source	Worst Case Scenario	Realistic Scenario	NRA Guidance Levels
10m	86 dB	79 dB	65 dB
20m	80 dB	73 dB	65 dB
40m	74 dB	67 dB	65 dB
80m	68 dB	61 dB	65 dB
160m	62 dB	55 dB	65 dB
320m	56 dB	49 dB	65 dB

It is expected that the 65dB threshold will not be exceeded at distances of 120m under worst case scenario and 60m under realistic scenario.

12.1.8.2.3 NRA Guidelines on Construction Noise

There is no statutory guidance in Ireland relating to the maximum noise levels permitted during construction works, and in the absence of statutory guidance or other specific limits prescribed by local authorities, the thresholds outlined in Table 1 of the NRA *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (2004) has been adopted in this appraisal. The Authority (NRA) considered that the noise levels, included in Table 12-10 below, are typically deemed acceptable, with the comment that more stringent levels might be appropriate in areas where pre-existing noise levels are low.

Table 12-10: Construction Stage Noise Level Thresholds at the façade of dwellings

Period	Working Hours	$L_{Aeq(1\ hour)}$ dB[4]	$L_{pA(Max)slow}$[5] dB
Monday to Friday	07:00 to 19:00hrs	70	80
Monday to Friday	19.00 to 22.00hrs[6]	60*	65*
Saturday	08:00 to 16:30hrs	65	75

The results of background noise monitoring at Coole/Mountphilips (see Appendix 12.2: Background Noise Measuring & Operational Noise Modelling) show that when averaged for each of the day, evening and night time periods that the noise monitoring location can be considered an area of low background noise, during calm weather at least. Background noise surveys undertaken in 2012 in the vicinity of the Upperchurch Windfarm (see **2013 RFI**) demonstrated that this area is also an area of low background noise. As a result it is considered that background noise levels are generally low throughout the study area with higher levels of background noise along the Regional Road and in the vicinity of Newport town, and therefore the threshold

[4] L_{Aeq}): An indication of the average level of noise heard
[5] $L_{pA(Max)}$: An indication of the maximum sound level heard
[6] As stated in both the NRA Guidelines (2004) construction at these times or outside the times indicated in the table, except for emergency work, will require the explicit permission of the relevant local authority.

level of 65dB applies. It should be noted that the 60dB level is not applied because works will not take place beyond 7pm.

12.1.8.2.4 TII Guidelines for Evaluating Construction Stage Vibration Effects

Vibration emissions are limited to the construction phase.

According to TII's 2014 Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, *'the NRA's Guidelines point out that there are two separate considerations for vibration during the construction phase: that which affects human comfort and that which affects cosmetic or structural damage to buildings. There is a third category: that which affects sensitive equipment or processes, which could include installations concerning gas, water, electricity and telecommunications.*

The Guidelines suggest that human tolerance for daytime blasting and piling, two of the primary sources of construction vibration, limits vibration levels to a peak particle velocity (ppv) of 12mm/s and 2.5mm/s respectively.

To avoid the risk of even cosmetic damage to buildings, the Guidelines suggest that vibration levels should be limited to 8mm/s at frequencies of less than 10Hz, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above'.

No blasting or piling will be required for UWF Grid Connection.

12.1.8.2.5 Operational Phase Noise from the proposed Mountphilips Substation

Operational Stage noise is limited to the Mountphilips Substation for UWF Grid Connection.

Quiet Area Screening: As the Mountphilips Substation will be a permanent fixture with noise emissions a Quite Area screening was carried out for the location of the substation. The Screening is included in Appendix 12.2: Background Noise Measuring & Operational Noise Modelling. In summary the area is not classed as a 'Quiet Area'.

Low Background Noise Area Screening: As all of the criteria for Quiet Area classification are not met, then screening was carried out to see if the area met the criteria for a low background noise area. The Screening is included in Appendix 12.2. In summary, the Mountphilips/Coole area can be considered an area of low background noise, during calm weather at least.

IEMA Guidelines for Environmental Noise Impact Assessment

The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment, November 2014, were used to evaluate the magnitude of impacts, the sensitivity of receptors and the level of significance of any effects during operation of the Mountphilips Substation. The criteria outlined in Tables 12-11 to 12-13 have been sourced from these Guidelines.

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

EPA Terminology	Description	Receptor Perception of Effects
Negligible	No discernible change in the baseline environmental conditions, within margins of error of measurement	Not Noticeable
Small	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated	Noticeable and not intrusive

Medium	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be marginally exceeded or to result in undesirable/desirable consequences on the receiving environment.	Noticeable and intrusive
Large	Impact resulting in a considerable change in baseline environmental conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable/desirable consequences on the receiving environment.	Noticeable and disruptive

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

EPA Terminology	**Description**
Negligible	Receptor/ resource is not sensitive to noise.
Low	Receptor/resource is tolerant of change without detriment to its character or is of low or local importance. For example industrial estates
Medium/ Moderate	Receptors/resource has moderate capacity to absorb change without significantly altering its present character. For example residential dwellings, offices, schools, and play areas. Locally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
High	Receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance. For example hospitals, residential care homes, and internationally and nationally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).

Table 12-13: IEMA (2014) Guidelines for Evaluating the Impact Significance Matrix

Magnitude	**Sensitivity of Receptor**			
	Negligible	Low	Medium/ Moderate	High
Negligible	None	None	None	None
Small	None	Slight	Moderate	Moderate
Medium	None	Moderate	Substantial	Substantial
Large	None	Moderate	Substantial	Very Substantial

12.1.8.2.6 Operational Phase Noise from the Upperchurch Windfarm

The consented UWF Turbines and the Consented UWF Substation will be required to meet strict noise limits as described in the Conditions of Planning. These noise limits, which are set out in Condition 11 of the Grant of Permission (2014), which apply at the nearest relevant receptors, are considered by the consenting authorities to be acceptable in terms of the protection of residential amenity, without unduly restricting wind farm development.

Condition 11: *Wind Turbine Noise arising from the proposed development by itself or in combination with other existing or permitted wind energy development in the vicinity shall not exceed the greater of (a) 5 dB(A) above background noise levels or (b) 43 dB(A) L90 10 min, when measured externally at dwellings of other sensitive receptors. (Ref: ABP 22.243040)*

12.1.8.3 Methodology for Evaluating Electromagnetic Fields Effects

12.1.8.3.1 Treatment of the Existing Electricity and Communication Networks

The contribution to EMF levels from existing 110kV or 220kV overhead lines is considered in the cumulative impact of the Impact Evaluation Tables for EMF. The local electricity (10kV, 20kV, 38kV) networks and communications (eir) networks, on the other hand, are considered as part of the existing environment.

12.1.8.3.2 Treatment of Naturally Occurring Electric and Magnetic Fields

Naturally occurring electric and magnetic fields differ from the electromagnetic Fields (EMF) which are produced by the power system as naturally occurring EMF do not change direction and are, therefore, referred to as static or direct current (DC) fields, whereas EMF from power systems fluctuates at a fixed frequency and are referred to as alternating current (AC) fields.

As EMF from the two sources (natural, power systems) differ from each other, naturally occurring electric and magnetic fields are not included in the baseline environment. Further details on electromagnetic fields is provided in Appendix 12.3: Explanation and Modelling of Electromagnetic Fields.

12.1.8.3.3 Authors Methodology for Modelling Theoretical Worst-Case Effects

In order to categorically demonstrate that the maximum possible power load of the electric cables and equipment associated with the whole UWF project, will comply with the EU EMF Exposure Recommendations and the International Commission on Non-Ionising Radiation Protection (ICNIRP) limits, the theoretical worst-case contribution of the operational Whole UWF Project, to EMF levels in the environment is evaluated in this report. The criteria for modelling the worst-case levels of EMF are outlined in Appendix 12.3: Explanation and Modelling of Electromagnetic Fields.

12.1.8.3.4 ICNIRP General Public Reference levels

In this EIA Report chapter, the compliance of the various electrical and radio communications elements of the whole windfarm has been evaluated against the directives and legislation listed in Section 12.1.7 above, and against the 1998 guidelines on limiting exposures to electromagnetic fields as published by the ICNIRP. The European Union and the Irish Government have adopted the ICNIRP 1998 guidelines, which are outlined in Table 12-14 below. 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”.

Table 12-14: ICNIRP 1998 EMF Limits

Exposure Characteristics ICNIRP	**Electric Field Strength V/m**	**Magnetic Field Strength µT**
1998 General Public Refere7nce Level	5000	100
2010 General Public Reference Level	5000	200

A conservative approach has been adopted in this EIAR, in that the lower 1998 levels have been used to evaluate the significance of any increases in EMF.

12.1.8.4 Authors Methodology for Evaluating the Magnitude and Significance of Impacts

The significance of the impact for each identified sensitive receptor will be assessed according to the impact magnitude according to Table 12-15 and Table 12-16.

Table 12-15: Determining magnitude and significance of effects in relation to Electric Fields

Magnitude		Significance of Effects		
Magnitude Rating	Field Strength	Local Residents & Community	Transient People	Electronic Equipment
Very Low (1)	< 1 V/m	**Imperceptible** Similar to existing ambient levels	**Imperceptible** Similar to existing ambient levels	**Imperceptible** Similar to existing ambient levels
Low (2)	1V/m - 1000 V/m	**Slight** Similar to existing ambient levels from residential electric equipment	**Imperceptible** Higher than existing ambient levels	**Imperceptible** Similar to existing ambient levels from Electric Equipment
Medium (3)	1000 V/m-5000 V/m	**Slight** Under EU EMF limits Under HSA Low Action limit	**Slight** Significantly higher than existing ambient levels but length of exposure is momentary or brief	**Slight to moderate** Above existing ambient levels from Electric Equipment
High (4)	5000 V/m -10000 V/m	**Moderate** Above EU EMF limits Above HSA Low Action limit	**Moderate** Above EMF limits although not applicable	**Significant** Above EU AIMD[7] Device Immunity Test levels
Very High (5)	>10000 V/m	**Profound** Above EU EMF limits Above HSA High Action limit	**Significant to Profound** Significantly above AIMD Immunity Test Level	**Profound** Significantly above electrical device test levels

[7] AIMD is the abbreviation for 'Artificial Implantable Medical Devices' such as pacemakers and defibrillators

Table 12-16: Determining magnitude and significance of effects in relation to Magnetic Fields

Magnitude		Significance of Effects		
Magnitude Rating	**Field Strength**	**Local Residents & Community**	**Transient People**	**Electronic Equipment**
Very Low (1)	< 0.1 to 1.26 µT (micro Tesla)	**Imperceptible** Similar levels to existing ambient levels	Imperceptible Similar to existing ambient levels	**Imperceptible** Similar to existing ambient levels Below EU Residential and Light Industrial Electronic device Immunity limit (1.26 µT)
Low (2)	1.26-38 µT	**Imperceptible** Higher than existing ambient levels Under EU EMF limits Under HSA public limit	**Imperceptible** Higher than existing ambient levels	**Imperceptible to Slight** Above EU Residential and Light Industrial Electronic device Immunity limit (1.26 µT)
Medium (3)	38-100 µT	**Slight** Under EU EMF limits Under HSA public limit	**Imperceptible to Slight** Significantly Higher than existing ambient levels but exposure not long term	**Slight** Above EU Industrial Electronic device Immunity limit (38 µT)
High (4)	100-1000 µT	**Moderate** EU EMF limits exceeded HSA Low Action Level reached	**Moderate** Above EU EMF limits although not applicable	**Moderate to Significant** Above EU AIMD Device test levels
Very High (5)	>1000 µT	**Significant** EU EMF and HSA levels breached **Profound** > 6000 µT HSA High Action Level reached	**Significant to Profound** EU EMF and HSA levels breached but not applicable to transient people Above Test Levels for AIMD Devices	**Profound** Significantly above All Electrical Device test levels

12.1.9 Certainty and Sufficiency of Evaluation/Information

Air Quality: The information used to compile the air quality sections of this chapter is collated from reports and documents generated by local authorities and statutory agencies, including the Environmental Protection Agency, Transport Infrastructure Ireland, The UK Institute of Air Quality Management[8] and The UK Department for Environment, Food and Rural Affairs. The most recent publications have been relied upon, with references detailed as footnotes throughout the chapter. The UK guidance has been used in the absence of equivalent Irish guidance as is considered best practice. The most recent monitoring data provided by the EPA was used to inform the baseline conditions. See Appendix 12.1: Air Quality Monitoring & Standards.

Noise: The information used to compile the noise and vibration sections of this chapter was based on best practice and guidance as described throughout this document. The baseline information used for the purpose of this assessment has been acquired through a combination of site visits, visual observations, mapping and noise measurements. Background noise measures were carried out in the vicinity of the proposed Mountphilips Substation, and a proxy noise measurement (using calibrated and certified equipment) of an existing 110kV substation was undertaken and applied to the proposed Mountphilips Substation. The use of this proxy measurement is considered sufficient and acceptable as method of determining any potential noise impacts of the Mountphilips Substation. Noise levels documented in industry standard best practice and guidance documentation, BS 5228 Noise and Vibration from Open and Construction Sites, 2014, has been used in determining the potential impact of the UWF Grid Connection construction works. Calculations undertaken err on the side of caution and overestimation. See Appendix 12.2: Background Noise Measuring & Operational Noise Modelling.

EMF: The information used to compile the Electromagnetic Fields sections of this chapter is collated from reports and documents generated by national and international authorities and statutory agencies, including the Commission for Communication Regulation (Comreg), International Commission for Non-Ionizing Radiation Protection (ICNIRP), Health and Safety Authority (HSA), Eirgrid in Ireland, National Grid in the United Kingdom and a selection of published and accessible scientific studies. Where possible the most recent publications are relied upon, with references detailed as footnotes throughout the chapter.

In respect of Air no significant limitations or difficulties were encountered.

[8] IAQM (2014) Guidance on the Assessment of Dust from Demolition and Construction

12.2 Sensitive Aspect No.1: Local Residents & Community

This Section provides a description and evaluation of the Sensitive Aspect - Local Residents & Community.

12.2.1 BASELINE CHARACTERISTICS of Local Residents & Community

12.2.1.1 STUDY AREA for Local Residents & Community

The study area for Local Residents & Community in relation to the UWF Grid Connection is described in Table 12-17 and illustrated on

Figure GC 12.2.1: UWF Grid Connection Study Area for Local Residents & Community (Dust & Noise) Figure GC 12.2.2: UWF Grid Connection Study Area for Local Residents & Community (Haulage Routes) and Figure GC 12.2.3: UWF Grid Connection Study Area for Local Residents & Community (EMF)

Table 12-17: UWF Grid Connection Study Area for Local Residents & Community

Study Area for Local Residents & Community	Justification for the Study Area Extents
Construction Dust: Dwellings and community facilities within 350m of construction works areas - See Figure GC 12.2.1 and Dwellings and community facilities within 50m of main transport routes used by construction vehicles – See Figure GC 12.2.2.	Based on Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, and the Guidance on the Assessment of Dust from Demolition and Construction.
Construction Noise and Vibration: 350m from construction work areas. – See Figure GC 12.2.1.	Based on the Guidelines for the Treatment of Noise and Vibration in National Road Schemes, the Guidelines recommend that receptors within 300m of a route be identified, however in the interest of simplicity, the wider Air Quality study area of 350m from construction works is used in the appraisal.
Operational Noise: 400m from Mountphilips Substation. – See Figure GC 12.2.1.	Beyond this distance, there is no potential for any increases in ambient noise levels.
Operational EMF: 100m from Mountphilips Substation and 110kV UGC– See Figure GC 12.2.3.	Based on professional judgement, EMF Field emissions can extend to this distance. At distances greater than 100m from the Mountphilips Substation and 110kV UGC, the contribution of the UWF Grid Connection to ambient EMF levels will be extremely low or none, with effects being considered neutral or none.

12.2.1.2 Baseline Context and Character of Local Residents & Community in the UWF Grid Connection Study Area

The number of local residences and community facilities within the study area are outlined on Table 12-18 and included on Figures GC 12.2 (Figure GC 12.2.1, Figure GC 12.2.2 and Figure GC 12.2.3).

As illustrated on Figures GC 12.2, the majority of the residential dwellings are along the local road network to the north of Newport town (L2166-10, L2157-0, and L6009-0 on the outskirts of Newport town), and along the Regional Road R503 particularly in the Lackamore area and particularly in the vicinity of Rear Cross village. The majority of community facilities are located in the village of Rear Cross, with community facilities also

available in the nearby town of Newport, and to a lesser extent in the nearby villages of Klicommon and Upperchurch.

Table 12-18: Number of Local Residences and Community within the UWF Grid Connection Study Area

Study Area for Local Residents & Community	Number of Local Residences and Community Facilities
Construction Dust: **350m of construction works areas**	391 No. residences 19 No. community facilities **Total = 410**
Construction Dust: **50m of main transport routes**	312 No. residences, and 33 No. community facilities **Total = 346**
Construction Noise and Vibration: **350m from construction work areas**	391 No. residences 19 No. community facilities **Total = 410**
Operational Noise: **400m from Mountphilips Substation**	6 No. residences **Total = 6**
Operational EMF: **100m from Mountphilips Substation and 110kV UGC**	None within 100m of the Mountphilips Substation. 317 No. local residences along 110kV UGC 17 No. community facilities along 110kV UGC **Total = 334**

Air Quality: All residential properties and community facilities, within the UWF Grid Connection Study Area, are located within EPA Air Quality Monitoring Zone D. Overall, there is a good air quality baseline for the area. Background concentrations of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) are very low in this area and are substantially below the EU limit values.

Further details on the limit values and on baseline air quality are included in Appendix 12.1: Air Quality Monitoring & Standards.

Noise: The majority of construction works areas can be characterised as a quiet rural location with no major existing or dominating noise or vibration sources. Baseline noise monitoring undertaken at the Mountphilips Substation location confirms that the area surrounding the substation is an area of low background noise (See Appendix 12.2: Background Noise Measuring & Operational Noise Modelling). Considering the location of the 110kV UGC along the public road network, the route of the 110kV UGC is not considered to be located in an area of low background noise.

Vibration: There are no significant sources of vibration in the area.

EMF: Electrical objects and anything connected to them produce two types of fields - electric fields and magnetic fields. Electric and magnetic fields are produced in all residential and working environments as a result of nearby electrical wiring, appliances, power lines and telecommunication masts, among other things. Electric fields are measured in volts per meter (V/m), and magnetic fields measured in microtesla (µT). The ICNIRP guideline levels (See Section 12.1.8.3.4) in relation to the general public for exposure to frequency EMF associated with electrical power systems, is 5000V/m for electric fields exposure and 100µT for magnetic field exposure. It is assumed in this report that the existing electric field and magnetic field levels, at local residential dwellings and community facilities, are 10V/m and 0.2 µT respectively, which is substantially under the ICNIRP guideline levels. Further details on electric and magnetic fields and typical levels from common household appliances and from 110kV electrical power system infrastructure is included in Appendix 12.3: Explanation and Modelling of Electromagnetic Fields.

EMF – Electronic Equipment: Two types of electronic equipment are evaluated in this section; electronic equipment or appliances which are assumed to be used in all local residences, businesses and community facilities and Artificial Implantable Medical Devices (AIMDs) such as pacemakers which could be worn by local residents or members of the community within 100m of the 110kV UGC. Currently, the EMF levels to which electronic equipment is being exposed to is likely to be in the region of 10V/m and 0.2 µT.

12.2.1.3 Importance of Air (Local Residents & Community)

Air Quality: The low number of residential properties is common in rural, upland areas of Ireland, as is their distribution with the majority of properties and community facilities within the UWF Grid Connection Study Area centred around Rear Cross village, and in ribbon development along the regional and local roads. In general there is a reasonable expectation for a good quality of air in these upland areas which are remote from busy, congested roads and industrial sources of air pollutants.

Noise: Rural environments are generally regarded as quiet areas, in contrast to urban areas. Areas with low background noise levels are recognised as having a greater amenity and quality of life value.

EMF: The ICNIRP guidelines form the basis of the EU guidelines for human exposure to EMF (EC Council Recommendation 1999/519/EC[9]). These exposure guidelines apply only where members of the public could be expected to spend significant periods of time (EC, 1999). In this report, these members of the public relate to local residents and users of local community facilities including businesses.

Electronic equipment such as washing machines and other electrical appliances in local residences, business premises or community facilities are required, under EU legislation (EMC Directive 2013/30/EU), to have an immunity level of at least 1.26 µT for a 50 Hz magnetic field, to safeguard the normal operation of the electronic device from interruption or degradation caused by EMF.

Artificial Implantable Medical Devices (AIMDs) which may be worn by local residents or members of the community, such as pacemakers are tested to higher EMF Immunity levels to safeguard operation according to EU regulations (CENELEC 50527-1:2010). A limit of 100 µT applies to 50 Hz magnetic fields and 5000 V/m to 50 Hz electric fields. It should be noted that these are the same limits as the ICNIRP limits adopted by the EU for the general public and used in this chapter of the EIA Report.

12.2.1.4 Sensitivity of Local Residents & Community

Air Quality: Local residents and people using community facilities could be sensitive to health effects such as respiratory illnesses as a result of breathing polluted air. All local residences and community facilities are considered 'high-sensitivity' locations (see Table 12-5).

Receptor sensitivity to dust impacts is considered to be **medium** because local residents and community can expect to enjoy a reasonable level of amenity at their residents or community facilities (which are generally in towns/villages or along the road network.

Receptor sensitivity to health impacts is considered to be **low** based on EPA monitoring that annual mean background level of PM_{10} are well below the objective limit and substantially less than 24 µg/m^3, as per the IAQM assessment guidance.

Noise & vibration: Local residents and communities are considered as **medium** sensitive receptors, as per Table 12-12, 'Receptors/resource has moderate capacity to absorb change without significantly altering its present character. For example residential dwellings, offices, schools, and play areas'.

[9] https://ec.europa.eu/health/sites/health/files/electromagnetic_fields/docs/emf_rec519_en.pdf

EMF: Local Residents and members of the community could raise health concerns if the levels of EMF Exposure within their residences and premises are deemed to breech the 1998 ICNIRP limits. A substantial increase in EMF levels above EU electric and electronic equipment Immunity test levels could cause the malfunction of equipment. Neither of these scenarios will occur, and high voltage substations and underground cables in Ireland do not exceed either the 1998 or 2010 EMF limits.

Note: Electronic Equipment in machinery and vehicles are not commonly susceptible to 50 Hz magnetic fields, and are excluded from further consideration in this EIA Report.

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

Air Quality: There are no specific future trends in relation to air quality. In Ireland the primary sources of Particulate Matter (PM_{10} and $PM_{2.5}$) are vehicular emissions and burning of solid fuels for heating. In general, air quality is likely to improve in future years with a reduction in the use of diesel and petrol vehicles and increased usage of renewable sources of electricity. However, due to the nature of the area (remotely populated with no congested roads) PM emissions are unlikely to change dramatically in future years.

Operational Noise & EMF: There has been a trend of renewable energy development in the eastern extent of the 110kV UGC, with Milestone Windfarm becoming operational in 2018. The addition of further wind energy development, for example the consented Upperchurch Windfarm will mean an additional noise and EMF sources in the area and an increase in ambient noise levels within the bounds of the noise limits as imposed by conditions of planning. Electrical and Users of Electronic Equipment and radio frequency technology will increasingly become more present in everyday life; the expansion of the power infrastructure in the country is also expected albeit at a much slower rate; however government regulations will ensure EMF levels remain significantly lower than the ICNIRP standard limits.

12.2.1.6 Receiving Environment (the Baseline + Trends)

Air Quality: There are no specific future trends for construction dust emissions in the UWF Grid Connection Study Area. It is assumed that in relation to dust, the receiving environment will be similar to the baseline environment.

Noise: The receiving environment at the time of construction will include the noise sources in the current baseline environment, but will not include operational Consented UWF Turbines.

EMF: A continued adoption of electrical and electronic infrastructure and equipment, will increase the background level of EMF at a very slow rate over time. It is not expected for EMF levels to increase significantly above existing average levels of 10V/m or 0.2µT in local residents and the receiving environment during the operational stage is assumed to be similar to the baseline environment identified above.

12.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

12.2.2.1 Cumulative Evaluation Study Areas

12.2.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

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

UWF Grid Connection Cumulative Evaluation Study Area for Local Residents & Community	Justification for the Study Area Extents
Construction Dust, Noise & Vibration: Air Quality, Noise & Vibration: 700m from UWF Grid Connection construction works. 50m from main transport routes. Operational noise: 800m from Mountphilips Substation Operational EMF: 200m from Mountphilips Substation and 110kV UGC	Local Residents & Community could potential be effected by dust, noise, vibration and EMF sources from different directions either at the same time or sequentially and therefore the distance from the source was doubled from that used for the UWF Grid Connection (the exception being noise along haulage routes, which remains the same, as cumulative impacts related to any additional traffic on the haul routes).

The study area is illustrated on Figure CE 12.2.1: UWF Grid Connection Cumulative Evaluation Study Area for Local Residents & Community (Dust & Noise), Figure CE 12.2.2: UWF Grid Connection Cumulative Evaluation Study Area for Local Residents & Community (Haulage Routes), Figure CE 12.2.3: UWF Grid Connection Cumulative Evaluation Study Area for Local Residents & Community (EMF)

12.2.2.1.2 Whole Project Cumulative Evaluation Study Area

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

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

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 12.2.2.2.1 below.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on

Figure WP 12.2.1: Whole Project Study Area for Local Residents & Community (Dust & Noise) Figure WP 12.2.2: Whole Project Study Area for Local Residents & Community (Haulage Routes) (Volume C3 EIAR Figures) and Figure WP 12.2.3: Whole Project Study Area for Local Residents & Community (EMF)

Table 12-19: Cumulative Evaluation Study Area for Local Residents & Community

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Construction Dust, Noise & Vibration: Air Quality, Noise & Vibration: 700m from construction works, 50m from main transport routes,	Local Residents & Community could potential be effected by dust, noise, vibration and EMF sources from different directions either at the same time or sequentially and therefore the distance
Element 2: UWF Related Works		
Element 3:		

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
UWF Replacement Forestry Element 4: Upperchurch Windfarm (UWF) Element 5: UWF Other Activities	Operational Noise: 800m from both the Mountphilips Substation and Consented UWF Substation Operational EMF: 200m from 110kV UGC, Internal Windfarm Cabling, Consented UWF Turbines and Consented UWF Substation.	from the source was doubled from that used for the UWF Grid Connection.

12.2.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Local Residents & Community also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Local Residents & Community with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.24).

The results of this scoping exercise are that: the existing Shannonbridge – Killonan 220 kV OHL and the Castlewaller Windfarm (consented windfarm and potential grid connection) has been scoped in for evaluation of cumulative effects to Local Residents & Community.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 12.2.1 to Figure WP 12.2.3.

12.2.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Local Residents & Community

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Local Residents & Community. The results of this evaluation are included in Table 12-20. The baseline character of the areas around these projects is described in Section 12.2.2.3.

Table 12-20: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Elements of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: Neutral Impacts or No Impacts due to • The planting of the new woodland will have a neutral impact on air quality as works will be carried out by hand using spades, with use of vehicles limited to personnel vehicles and negligible traffic volumes associated with the planting stage. • No potential for adverse air quality impacts during the growth stage, due to the absence of dust creating activities and negligible traffic volumes. • There is no potential for noise or vibration effects, as there will be no sources of mechanical noise or vibration because planting will be carried out by hand (Project Design Measure) in grassland fields.

	• During the growth stage, chainsaws may be used during thinning activities, however this type of activity will be infrequent, brief in nature and at a distance from local residents, therefore it is considered that noise related impacts will be neutral during any thinning activities during the growth stage. • There is no potential for impacts due to EMF emissions as there are no electrical or radio-communication parts associated with the UWF Replacement Forestry.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral Impacts or No Impacts due to: • Neutral effect on Air Quality - any activities will be of a very short duration, minimal extent and will involve minimal use of vehicles or equipment. • Neutral effect on ambient noise or vibration levels due to the momentary to brief duration of activities at any one location, and the generally low-medium noise levels of the equipment used. Equipment which will be used includes a hedge cutter, tractor, vans, and cable-pullers and hand tools. Activities will take between 15 minutes and 2 days to complete at the various locations Specifically in relation to Haul Route Activities, any noise or vibration emitted by machinery or vehicles used will be in the context of background noise and vibration from regional or national roads, or will not be noticeable in the context of local traffic and farming activity. . • No potential for increases in ambient EMF levels, as there are no electrical or radio-communication parts associated with the Overhead Line Activities.
Other Projects or Activities	
Shannonbridge – Killonan 220kV OHL (existing)	Yes, included for the evaluation of cumulative effects in relation to EMF effects. Evaluated as excluded in relation to dust, noise or vibration effects, as there is no potential for cumulative effects because the 220kV OHL already exists and therefore no construction works are associated with this line and no upgrade works are expected to occur during the construction stage of the UWF Grid Connection. No potential for cumulative operational noise effects due to separation distances to nearby houses and in addition noise from the existing overhead lines at Coole and Mountphilips are considered part of the baseline noise levels measured in the area.
Castlewaller Windfarm (consented windfarm and potential grid connection)	Yes, included for the evaluation of cumulative effects in relation to EMF effects. Evaluated as excluded in relation to dust, noise or vibration effects, as The potential for cumulative impacts only relates to the potential grid connection and R503 site entrance works. No potential for cumulative impacts with the windfarm, due to separation distance. In relation to the potential grid connection and site entrance works, cumulative construction impacts are not expected as works will either take place at separate times, or should works be carried out at the same time, then works on the grid connection for both projects are likely to be carried out by one crew, with no material cumulative increase in noise or dust at local residents, and although a longer construction periods is possible on the local road L6009-0, this will not cause significant effects to residential amenity, as the works are still temporary and of short duration, during daylight hours. Works at the R503 entrance will not cause cumulative significant impacts to local residents due the very short duration of both 110kV UGC works and the entrance works.

12.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

12.2.2.3.1 Element 2: UWF Related Works, Element 4: Upperchurch Windfarm

The number of local residences and community facilities within the Cumulative Evaluation Study Area are outlined on Table 12-21 and included on Figures WP 12.2 (Figure WP 12.2.1 to Figure WP 12.2.3).

Table 12-21: Number of Local Residences and Community within the Cumulative Evaluation Study Area

Individual Project Element	Local Residents & Community within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Local Residents & Community within 50m of Materials Haulage Routes (Air Quality only)	Local Residents & Community within 100m Of Electrical Parts (EMF only)
UWF Related Works	41 No. residences (9 no. within 50m) No community facilities	33 No. residences along Material Haulage Routes No community facilities.	9 No. local residences within 100m of the Internal Windfarm Cabling No community facilities
Upperchurch Windfarm	29 No. local residences within 350m, 3 No. within 50 of site entrances, None within 200m of a Consented UWF Turbine. No community facilities	33 No. residences along Material Haulage Routes No community facilities	No local residences or community facilities within 100m of the Consented UWF Turbines or Consented UWF Substation.

Air Quality: All residential properties and community facilities, within the Cumulative Evaluation Study Area, are located within EPA Air Quality Monitoring Zone D. Overall, there is a good air quality baseline for the area. Background concentrations of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) are very low in this area and are substantially below the EU limit values. Further details on the limit values and on baseline air quality are included in Appendix 12.1: Air Quality Monitoring & Standards.

Noise: The majority of the Cumulative Evaluation Study Area can be characterised as a quiet rural location with no major existing or dominating noise or vibration sources. Background noise surveys undertaken in 2012 in the vicinity of the Upperchurch Windfarm (see 2013 RFI) demonstrated that this area is also an area of low background noise. See Appendix 12.2: Background Noise Measuring & Operational Noise Modelling.

Vibration: There are no significant sources of vibration in the area.

Consideration of the Passage of Time: There have been no new houses built within 350m of the Upperchurch Windfarm since 2013, and while the Milestone Windfarm was built in 2018, and is now operational, this windfarm was considered cumulatively in the 2013 and 2014 assessments for the consented Upperchurch Windfarm. Therefore it is considered that the descriptions in the 2013 and 2014 documents remain relevant to the cumulative evaluations in this EIAR

12.2.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 12.2.2.2.1

12.2.2.3.3 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 12.2.2.2.1

12.2.2.3.4 Other Projects or Activities

Shannonbridge – Killonan 220kV OHL: There is 1 No. local residence (no community facilities) within 100m of both the 110kV UGC (95m distance) and the existing 220kV OHL (53m distance). This residence is located in Coole townland on the L2166-0.

Castlewaller Windfarm: There are 33 No. local residence (no community facilities) within 100m of the potential Castlewaller Windfarm grid connection along the local road L6009-0 at Castlewaller / Carrowkeale / Derryleigh.

12.2.3 PROJECT DESIGN MEASURES for Local Residents & Community

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

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

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

The Project Design Measures outlined in Table 12-22 are relevant to the Environmental Factor, Air, and in particular to the sensitive aspect **Local Residents & Community**.

Table 12-22: UWF Grid Connection Project Design Measures relevant to Local Residents & Community

PD ID	Project Design Environmental Protection Measure (PD)
PD04	All construction works will be carried out during daylight hours.
PD05	At the Mountphilips Substation site, construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted. A speed limit of 25km/hr for all traffic/machinery will be implemented at the Mountphilips Substation site. Outside of Mountphilips Substation site, all construction will be restricted to the paved road surfaces or built surfaces along the 110kV UGC. A speed limit of 50km/hr for all delivery and construction traffic will be implemented on Local Roads ('L' roads).
PD06	Construction works will not be carried out within 150m of Rearcross National School or Lackamore National School, during school hours. In addition, the project Community Liaison Officer will keep each school informed of construction timetables and scheduling.
PD07	110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads.
PD11	Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m.

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

12.2.4 EVALUATION OF IMPACTS to Local Residents & Community

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

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

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

Table 12-23: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Increase in Airborne Dust (construction stage)	*Increase in ambient electromagnetic fields (EMF) levels (construction stage)*
Increase in ambient noise levels (construction stage)	*Vibration damage to buildings or internal nuisance to residents (construction stage)*
Increase in ambient noise levels (operational stage)	*Decrease in ambient air quality as a result of traffic derived pollutants (NO_2, PM_{10}, $PM_{2.5}$, CO, Benzene (construction stage)*
Increase in ambient EMF levels (operational stage)	*Vibration emissions during the operational stage*
	Decommissioning Effects

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 12.2.4.1 to 12.2.4.4**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 12.2.4.5

12.2.4.1 Impact Evaluation Table: Increase in Airborne Dust

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Delivery of construction materials to works area, excavation and storage of materials.
Cumulative Impact Source: Delivery of construction materials to works area, excavation and storage of materials
Impact Pathway: Air/Wind

Impact Description: During dry and windy weather conditions, construction dust emissions will arise from construction activities such as excavations, earth moving and backfilling which may generate quantities of dust. Vehicles transporting potentially dusty material to and from the site also have the potential to cause dust generation along the concentrated haul routes from the construction areas. Dust deposition rates will be greatest within 50 m of the source. An increase in airborne dust can cause dust soiling effects at property and increase the risk of respiratory illness to local residents and members of the local community.

Impact Quality: Negative

Evaluation the Subject Development Impact – Increase in Airborne Dust

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude: The emission of dust from excavation and backfilling of 28,680m^3 of potentially dusty materials (rocks, soils etc.), the storage and handling of 5,000m^3 of this material at the Mountphilips Substation site, and the delivery of 1,350 loads of potentially dusty materials to site (aggregate). The potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction.

There are no local residences or community facilities within 350m of the Mountphilips Substation - the closest residence is 385m to the east. There are 312 No. local residences and 33 No. of community facilities in total within 50m of haulage routes along public roads (R503, L2166-0, L2166-10, L6013-0, L2156-0, L2157-0, L6009-0, L2264-50, L6188 and the L5337-1).

There are 391 No. local residences and 19 No. of community facilities within 350m of the UWF Grid Connection construction works areas, however dust from the 110kV UGC trenches and joint bay excavations will be minimal, and will take place in stages rather than all at once.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- Medium sensitivity of local residents and community to dust impacts
- the medium magnitude of dust soiling as a result of earthworks, construction and trackout, as per Section 12.1.8.1.7; in the context of the
- temporary duration of works;
- the reversibility of the impact,
- transitory and predominantly linear nature of the works
- background levels of particulate matter are substantially below the relevant EU limit values

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative in-combination effects relates to construction stage dust from UWF Grid Connection and UWF Related Works and Upperchurch Windfarm as a result of earthworks, construction works and construction related haulage. Construction works for all 3 projects will occur in the Knocknabansha / Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, where 20 No. residences, located along the L2164-50 and L6188 local roads, are within 350m of UWF Grid Connection and

Upperchurch Windfarm works and UWF Related Works, while a further 9 No. houses are within 350m of UWF Grid Connection and UWF Related Works only.

17 No. residences will be within 50m of the haul routes for the projects which are routed along the L2164-50 and L6188 roads.

To protect Residential Amenity of residents along these roads, the sequential timing of construction works which is part of the UWF Grid Connection project design (See Section 12.2.3), will ensure that local residences are not effected by multiple construction works being carried out at the same time. Therefore, there is no potential for in-combination effects, and any cumulative effects relate to a slightly longer duration of effects (sequential effects) rather than a larger magnitude of effects.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- Medium sensitivity of local residents and community to dust impacts
- the medium magnitude of dust soiling as a result of earthworks, construction and trackout, as per Section 12.1.8.1.7; in the context of the
- relatively low number of receptors;
- the implementation of timing/scheduling restrictions in the Knocknabansha / Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area;
- temporary duration of works, even when considered sequentially,
- the reversibility of the impact,
- transitory and predominantly linear nature of the works;
- background levels of particulate matter are substantially below the relevant EU limit values

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

Element 2: UWF Related Works

Impact Magnitude:
The emission of dust from excavation and backfilling of 11,830m^3 of potentially dusty materials (rocks, soils etc.), the storage and handling of 930m^3 of this material on site, and the delivery of 292 loads of potentially dusty materials to site (aggregate). The potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction.
There are 41 No. local residences but no community facilities within 350m of the UWF Related Works construction works areas.

There are 33 No. local residences are within 50m of haulage routes along local roads between the Upperchurch Windfarm site entrance No.1 and other various site entrances along local roads.

There are 51 No. residents in total within 50m of haulage routes and within 350m of the UWF Related Works construction works areas.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- low risk of human health or dust soiling impacts as a result of earthworks, construction and trackout, as per Table 12-5;
- temporary duration of works,
- the reversibility of the impact,
- transitory and predominantly linear nature of the works;
- background levels of particulate matter are substantially below the relevant EU limit values

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

Local Residents & Community

Sensitive Aspect

Element 4: Consented Upperchurch Windfarm
Impact Magnitude: As per the 2013 EIS, approximately 108,000m^3 of material will be excavated as part of the construction phase of the Upperchurch Windfarm; Six borrow pits will be constructed to quarry stone; 4.4ha of forestry will be felled; delivery of 4,960 loads of materials will be brought to site to construct 22 No. turbines and the associated concrete bases.
Significance of the Impact: No significant Impact
Rationale for Impact Evaluation: • The ABP Inspectors Report 2014 found that there were no significant impacts to Air Quality and any dust impacts are considered 'temporary in nature and confined to the immediate area'.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.2.2.2.1*
Evaluation of Other Cumulative Impacts – Increase in Airborne Dust
Whole UWF Project Effect
Magnitude: The extent of impacts from the whole project relates to 407 no. of local residences and 19 No. community facilities/businesses which are within 350m of construction works associated with UWF Grid Connection, Upperchurch Windfarm and UWF Related Works, and 326 No. local residences and 33. no community facilities/business which are within 50m of construction material haul routes. The potential for cumulative in-combination effects of all of the elements of the Whole UWF Project is limited to local residences located along the L2264-50 and L6188-0 local roads in the Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, which construction works associated with the UWF Grid Connection, Upperchurch Windfarm and UWF Related Works are located within 350m of 20 No. of local residences. To protect Residential Amenity of residents along these roads, the sequential timing of construction works is built into the project design (See Section 12.2.3), to ensure that local residences are not effected by multiple construction works being carried out at the same time. Therefore, there is no potential for in-combination effects, and any cumulative effects relate to a slightly longer duration of effects rather than larger magnitude of effects.
Significance of the Whole Project Effect : Slight
Rationale for Impact Evaluation: • low risk of human health or dust soiling impacts as a result of earthworks, construction and trackout, as per Table 12-5, • temporary duration of works, even when considered sequentially, • the reversibility of the impact, • transitory and predominantly linear nature of the works; • background levels of particulate matter are substantially below the relevant EU limit values

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 12.2.2.2.1).

Air

Topic

12.2.4.2 Impact Evaluation Table: Increase in Ambient Noise Levels

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Substation and UGC Construction - Working plant and moving machinery involved in construction and excavation activities
Cumulative Impact Source: Working plant and moving machinery and excavation activities
Impact Pathway: Air

Impact Description: Noise emissions from working plant or machinery, moving vehicles and the physical excavation of the ground will increase the levels of outdoor noise during works in any particular area. Construction of the 110kV UGC will predominately be linear and will progress quickly, and will be carried out during regular working hours. The main item of plant to be used will be an excavator, which will emit 79dB of noise at a separation distance of 10m. This is a piece of machinery with similar noise emissions to an agricultural tractor, which are commonplace in the area.

The NRA Guideline thresholds for construction noise emissions in an area of low background noise is 65dB (A), otherwise the threshold level is 70dB (A). As detailed in Appendix 12.2: Background Noise Measuring & Operational Noise Modelling, modelling of the worst case effect was carried out, and demonstrates that maximum worst case noise emissions from the machinery involved in the construction of the substation would be 86dB at 10m distance from works, reducing to 56dB at 350m from works. However, this modelling is very conservative and only attenuates noise based on distance and assumes that all machinery, listed in Ch.5, is working at the same location at the same time. Realistically construction noise will not exceed the 65dB (A) construction threshold beyond 60m, and will not exceed the 70dB (A) threshold at approximately 30m.

Impact Quality: Negative

Evaluation the Subject Development Impact – Increase in Ambient Noise Levels

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude: Construction works will be taking place at up to 5 different locations along UWF Grid Connection works areas at any one time – i.e. 1 crew working at the Mountphilips Substation, and up to 4 crews working at other UWF Grid Connection locations along the 30.5 km long 110kV UGC route.

There are no local residences or community facilities within 350m of the Mountphilips Substation - the closest residence is 385m to the east.

There are 394 No. local residences and 19 No. community facilities (mainly along the R503 and including 2 primary schools) within 350m of the 110kV UGC construction works areas. These receptors are located along the public road network, where the normal construction threshold of 70dB(A) applies. 278 No. of the 394 No. residences are within 60m of the construction works areas. Realistically construction noise will not exceed the 65dB(A) construction guideline noise threshold beyond 60m.

Significance of the Impact: Moderate

Rationale for Impact Evaluation:

- The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13)
- The NRA threshold limits are likely to be exceeded, at some locations
- Not all receptors will be impact simultaneously, with only small numbers of receptors impacted at any one time due to the progressive linear nature of the works.

Local Residents & Community

Sensitive Aspect

- The relatively short exposure during normal working hours with works within 350m of a receptor typically completed within 10 days, and works within 60m of a receptor generally completed within 1 to 2 days
- The temporary duration of potential exceedance of the guidelines limits (generally less than 1 week)
- The compliance with the guideline limits at all properties which are located farther 60m (realistic case) from works areas on the public road network
- The reversibility of the effect with the completion of works
- The carrying out of works during daytime hours

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative in-combination effects relates to additional construction stage noise from Upperchurch Windfarm and UWF Related Works where their construction works occur within the UWF Grid Connection Cumulative Evaluation Study Area. The potential for cumulative effects is concentrated in the Knocknabansha / Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area. The study area is 350m, however realistically construction noise will not exceed the 65dB (A) construction threshold beyond 60m, and will not exceed the 70dB (A) threshold at approximately 30m.

Cumulative impacts within 350m of UWF Grid Connection works could occur at

- 29. No local residences which will be within 350m of both UWF Grid Connection and UWF Related Works construction works areas – 4 no. of these residences are within 60m of construction works areas; and
- 20. No local residences (20 No. of the 29 No. identified above) which will be within 350m of UWF Grid Connection and UWF Related Works and Upperchurch Windfarm construction works areas – 2 no. of these residences are within 60m of construction works areas from all three projects.

To protect Residential Amenity of residents in the Knocknabansha / Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, the sequential timing of construction works is built into the UWF Grid Connection project design (See Section 12.2.3), to ensure that local residences are not effected by multiple construction works being carried out at the same time. Therefore, there is no potential for in-combination effects, and any cumulative effects relate to a slightly longer duration of effects (sequential effects) rather than larger magnitude of effects.

Significance of the Cumulative Impact: Moderate

Rationale for Cumulative Impact Evaluation:

- The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13)
- the NRA threshold limits are likely to be exceeded, at some locations; in the context of
- The relatively low number (20 No.) of houses which could be affected by sequential effects,
- The temporary total duration of exceedance of the guidelines thresholds (1 to 2 days within 60m of a local resident for UWF Grid Connection works),
- The compliance with the guideline limits at all properties which are located farther than 60m (realistic case) from works areas
- The reversibility of the effect with the completion of works
- The carrying out of works during daytime hours.

Air

Topic

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

Element 2: UWF Related Works

Impact Magnitude: Construction works will be taking place at several distinct locations at any one time. There are 41 No. local residences, but no community facilities, within 350m of UWF Related Works construction works areas. These receptors are located along the public road network close to the public road crossing points

of Internal Windfarm Cables or close to Haul Route Works. 10 No. of the 41 No. residences are within 60m of the construction works areas. Realistically construction noise will not exceed the construction limit beyond 60m.

Significance of the Impact: Moderate

Rationale for Impact Evaluation:

- the NRA threshold limits are likely to be exceeded, at some locations
- The low number of receptors (41 No.) within 350m of the works in the context of the spread of construction works over a large area, with works within 350m of a receptor typically completed within 10 days
- The very low number of houses at which the guideline thresholds will be exceeded – there are only 10 No. dwellings within 60m.
- The temporary duration of exceedance of the guidelines thresholds (generally less than 1 week)
- The compliance with the guideline limits at all properties which are located farther than 60m (realistic case) from works areas
- The reversibility of the effect with the completion of works
- The carrying out of works during daytime hours
- The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13).

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: There are 29 No. residences within 350m of the Upperchurch Windfarm works areas – specifically Site Entrances. However, there are no dwellings within 350m of the turbine hardstands which will be the main locations of noise emissions. As per the RFI 2013, the results of the construction noise predictive modelling indicate that the appropriate threshold of significance (65dB(A)) as outlined in BS5228-1:2009 will not be exceeded beyond 200m. There are no dwellings within this distance from turbine hardstand areas. As per the 2013 ABP Inspectors Report – 'The construction phase will be significant as there will be some level of disturbance arising in particular in relation to increased noise, air emissions and traffic but the overall range of impacts in the construction phase will be of a short term duration'

Significance of the Impact: Not be significant

Rationale for Impact Evaluation:
As per the 2013 Inspectors Report:

- The short term duration of works.
- The appropriate construction noise threshold (65dB (A)) as outlined in the RFI will not be exceeded beyond 200m, under conservative worst-case modelling scenario

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

Evaluation of Other Cumulative Impacts – Increase in Ambient Noise Levels

Whole UWF Project Effect

Magnitude:
The extent of impacts from the whole project relates to 407 no. of local residences and 19 No. community facilities/businesses which are within 350m of construction works associated with the Whole UWF Project. The vast majority of these properties are located along the public road network on the UWF Grid Connection 110kV UGC route.

The potential for cumulative in-combination effects of all of the elements of the Whole UWF Project is limited to the 29 No. local residences located along the L2264-50 and L6188-0 in the Knockmaroe / Knockcurraghbola Crownlands / Knockcurraghbola Commons area, which are within 350m of construction works associated with UWF Related Works; Upperchurch Windfarm; and UWF Grid Connection;. To protect

Local Residents & Community

Sensitive Aspect

Residential Amenity of residents along these roads, the sequential timing of construction works is built into the project design (See Project Information, Section 12.2.3), to ensure that local residences are not effected by multiple construction works being carried out at the same time. Therefore, there is no potential for in-combination effects, and any cumulative effects relate to a slightly longer duration of effects rather than larger magnitude of effects.
Significance of the Whole Project Effect: Moderate
Rationale for Impact Evaluation: • the NRA threshold limits are likely to be exceeded, at some locations • The low number (29 No.) of houses which could be affected by sequential effects, • The temporary total duration of exceedance of the guidelines thresholds, • The compliance with the guideline limits at all properties which are located farther than 60m (realistic case) from works areas • The reversibility of the effect with the completion of works • The carrying out of works during daytime hours • The small magnitude of works combined with medium sensitivity of receptors (see Tables 12-11, 12-12 & 12-13)

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 12.2.2.2.1).

Topic

Air

12.2.4.3 Impact Evaluation Table: Increase in Ambient Noise Levels

Impact Description	
Project Life Cycle Stage:	Operational Stage

Impact Source: Operational Mountphilips Substation,
Cumulative Impact Source: Operational Consented UWF Turbines, Consented UWF Substation
Impact Pathway: Air

Impact Description: Noise emissions from operational plant such as the operational Mountphilips Substation, or operational Consented UWF Turbines and Consented UWF Substation will increase the levels of outdoor noise in the vicinity of these structures.

Impact Quality: Negative

Evaluation the Subject Development Impact – Increase in Ambient Noise Levels

Element 1: UWF Grid Connection – direct/indirect effect

Impact Magnitude: There are 6 No. local residences (no community facilities) within 400m of the Mountphilips Substation. The nearest residence is 385m to the east of the substation along the L2166-0 local road. The Mountphilips/Coole area is not classed as a Quiet Area, however background noise measures undertaken in the area demonstrate that it is an area with Low background noise, and therefore EPA daytime/evening/night-time noise limited of 45dB, 40dB and 35dB apply.

For the purpose of this assessment a noise measurement was taken from a representative substation at a wind farm in County Kerry. A noise level of 60 dB(A) was measured at a distance of 5m from the representative substation. Noise modelling of the operational noise from Mountphilips Substation demonstrated that based on a noise level of 60 dB(A) at 5m, worse-case noise levels would be 22dB at 385m from the Mountphilips Substation. This is well below the lowest background noise threshold of 35dBA (night-time noise limit) for low background noise locations. See Appendix 12.2: Background Noise Measuring & Operational Noise Modelling for further details on modelling of operational noise emissions. The magnitude of increases in ambient noise levels cause by the Mountphilips Substation will be negligible and will have no discernible effect on local residents.

Significance of the Impact: No Impact

Rationale for Impact Evaluation:

- Negligible magnitude - there will be no discernible change in the baseline environmental conditions.

Element 1: UWF Grid Connection – cumulative effect

Impact Magnitude: The Mountphilips Substation is the only part of the UWF Grid Connection project that has potential to increase ambient noise levels – the 110kV UGC will not emit noise. Due to the separation distance between UWF Grid Connection and the Other Elements of the Whole UWF Project, there is no potential for cumulative effects.

Significance of the Impact: No Impact

Rationale for Impact Evaluation: No potential due to the separation distances (c.22km) between the Mountphilips Substation and the Other Elements of the Whole UWF Project.

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

Element 2: UWF Related Works

Local Residents & Community

Sensitive Aspect

Impact Magnitude: None,
Significance of the Impact: No Potential for Impact
Rationale for Impact Evaluation: • no sources of operational stage noise from any parts of the UWF Related Works.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.2.2.2.1*
Element 4: Consented Upperchurch Windfarm
Impact Magnitude: As per the ABP Inspectors Report 2013, 'What can be concluded from the noise assessment is that the development will impact in relation to noise as there will be a rise in noise levels from the current ambient noise levels associated with a rural area for many of the houses and sensitive receptors in the general and study area. The level of increase will however be within permitted levels for the most part even in a worst case scenario'. The Consented UWF Substation, will both emit similar levels of noise as the Mountphilips Substation, and the nearest house to the substation is similarly just under 400m (360m) from the Consented UWF Substation and will have no discernible effect on local residents.
Significance of the Impact: Moderate (turbines), No impact (substation)
Rationale for Impact Evaluation: • due to the small magnitude combined with medium sensitivity of receptors according to see Tables 12-11, 12-12 & 12-13 • The very low number of receptors (1) within 400m of the substation, and noise emissions from the operation of the Consented UWF Substation will not be audible above the existing background noise levels. • As per the ABP Inspectors Report (2013): 'What can be concluded from the noise assessment is that the development will impact in relation to noise as there will be a rise in noise levels from the current ambient noise levels associated with a rural area for many of the houses and sensitive receptors in the general and study area. The level of increase will however be within permitted levels for the most part even in a worst case scenario.
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.2.2.2.1*
Evaluation of Other Cumulative Impacts – Increase in Ambient Noise Levels
Whole UWF Project Effect
Magnitude: None.
Significance of the Whole Project Effect : No Potential for Cumulative Impact
Rationale for Impact Evaluation: • No potential due to the separation distance between the operational Mountphilips Substation and the Consented UWF Turbines and Consented UWF Substation

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 12.2.2.2.1).

Air

Topic

12.2.4.4 Impact Evaluation Table: Increase in Ambient EMF Levels

Impact Description	
Project Life Cycle Stage:	Operational Stage

Impact Source: Mountphilips Substation, 110kV UGC
Cumulative Impact Source: UWF Related Works Internal Windfarm Cabling, Consented UWF Turbines, Consented UWF Substation, 220kV Overhead line, Castlewaller Windfarm
Impact Pathway: Air/Ground

Impact Description: There will be some increase in electromagnetic field levels at local residences and community facilities which are within 100m of electrical or communication parts. Electrical or electron equipment or AIMDs worn by people also has potential to be affected by increased EMF. Details of the modelling of worst case EMF emissions are included in Appendix 12.3: Explanation and Modelling of Electromagnetic Fields.

Impact Quality: Negative

Evaluation the Subject Development Impact – Increase in ambient EMF levels

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude:

There are no residents or local community facilities within 100m of the Mountphilips Substation. The nearest residential property is 385m distance from the substation - there will no increase in ambient EMF levels at this property.
There will be some increase in magnetic field levels at the 317 No. local residences and 17 No. community facilities which are within 100m of the 110kV UGC. Electrical/electron equipment in these properties or facilities or AIMD worn by residents/community will also be exposed to increased magnetic field levels.

The increase will be highest at properties/facilities closest to the underground cables and will rapidly reduce with distance from the cabling. The nearest residence is 5m from the 110kV UGC. The nearest community facility (pub) is 15m from the 110kV UGC.

The worst case increase in levels of magnetic fields at local residences and community facilities will range from:
- 4.45µT to 0.13µT for residences/community/businesses between 5m and 30m from the 110kV UGC;
- 0.12µT to 0.05µT for residences/community/businesses between 31m and 50m from the 110kV UGC;
- 0.05µT to 0.01µT for residences/community/businesses between 51m and 100m from the 110kV UGC;

The levels of 4.45 µT at the very closest houses are have a marginally higher significance for electronic devices (EU Residential and Light Industrial Electronic device Immunity limit 1.26 µT). AIMDs such as pacemakers, which may be worn by local residents or members of the community, are tested to higher EMF Immunity levels to safeguard operation. A limit of 100 µT applies to these devices, which is the same limit as the ICNIRP limits adopted by the EU for the general public.

There will be no increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the concrete and backfill materials above the cables.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the Very Low magnitude of the increased magnetic fields level in local residences
- the new levels will be similar to existing ambient levels of 1.26 µT
- The new levels remain substantially under the EU EMF Limits 100µT for magnetic field exposure.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: Cumulative impacts only relate to 6 No. local residences which are within 100m of both the 110kV UGC and the Internal Windfarm Cabling for UWF Related Works, where the Internal Windfarm Cabling crosses the L2264-50 public road (and therefore crosses the 110kV UGC) in the Knockmaroe and Knockcurraghbola Crownlands area. Electrical/electron equipment and AIMDs may also be used/worn at these residences. The cumulative, worst case increase in magnetic fields will be 0.046 µT, which will increase ambient magnetic fields at the closest local residences to 0.246µT(i.e. 0.04+ + 0.2). No in combination effects with UWF Grid Connection will occur at any other residence or community facility.

There is no potential for cumulative impacts with Upperchurch Windfarm as there are no Consented UWF Turbines (nor the Consented UWF Substation) located within 100m of a residence or community facility.

Cumulative impacts with Other Projects relates to the combined impact of the 110kV UGC and the existing 220kV OHL. There is 1 No. residence in Coole on the L2166-0 which is within 100m of both projects. The 110kV UGC will increase magnetic fields at the 1 No. local residence by 0.01 µT. The worst case in-combination ambient magnetic field levels at the 1 No. local residence would be 0.99µT (i.e. 0.01 + 0.98). There is no potential for increased electric fields, as the electric fields from the 110kV UGC will be completely screened.

Cumulative impacts with Other Projects also relates to 33 No. local residences which are within 100m of both the of the 110kV UGC and the potential Castlewaller Windfarm grid connection, where the 110kV UGC (Upperchurch Windfarm) may be routed parallel to the potential Castlewaller Windfarm grid connection along the local road L6009-0 at Castlewaller / Carrowkeale / Derryleigh. Electrical/electronical equipment and AIMDs may also be used/worn at these residences. Should Castlewaller Windfarm grid connection be routed along this road, the maximum worst case cumulative EMF levels at the closest residence (9m from 110kV UGC) will be 1.64µT.

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- the Very Low magnitude of cumulative magnetic fields level in local residences
- the new levels will be similar to existing ambient levels at the closest local residences.
- The new levels remain substantially under the EU EMF Limits 100µT for magnetic field exposure.

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

Element 2: UWF Related Works

Impact Magnitude: There will be some increase in magnetic field levels at the 9 No. of local residences which are within 100m of the Internal Windfarm Cabling. Electrical/electronical equipment in these properties or AIMD worn by residents will also be exposed to increased magnetic field levels. The worst case increased levels of magnetic fields at local residences within 100m ranged from 0.001µT to 1.17µT.
No increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the earth (backfill) materials above the cables.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

In relation to the 110kV UGC:

- the Very Low magnitude of the increased magnetic fields level in local residences
- the new levels will be similar to existing ambient levels
- The new levels remain substantially under the EU EMF Limits 100µT for magnetic field exposure.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude: None

Significance of the Impact: No impact

Rationale for Impact Evaluation:

- No local residents or community within 100m of the Consented UWF Windfarm Substation, or the Consented UWF Turbines.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Shannonbridge – Killonan 220 kV Overhead Line (existing)

Impact Magnitude: There is 1 No. residence which is within 100m of the 220kV OHL (53m distant). Electrical/electronical equipment and AIMDs may also be used/worn at this residence. The 220kV OHL is currently increasing electric and magnetic field levels, under the worst case scenario, by 300 V/m and 0.98µT.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the Low magnitude of the electric fields level in accordance with Table 12-15
- the Very Low magnitude of the magnetic fields level in accordance with Table 12-16

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

Impact Magnitude: There will be some increase in magnetic field levels at the 33 No. of local residences which are within 100m of the potential Castlewaller Windfarm grid connection on the L6009-0. Electrical/electronical equipment in these properties or AIMD worn by residents will also be exposed to increased magnetic field levels. The worst case increased levels of magnetic fields at local residences within 100m ranged from 13.5µT (directly above Castlewaller Windfarm cables only) to 0.003µT at 100m distance.
No increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the earth (backfill) materials above the cables.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- the Low magnitude of the electric fields level in accordance with Table 12-15
- the Very Low magnitude of the magnetic fields level in accordance with Table 12-16

Evaluation of Other Cumulative Impacts – Increase in ambient EMF levels

Whole UWF Project Effect

Cumulative Impact Magnitude:
In total there are 361 No. local residents or community facilities within 100m of electrical parts associated with the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm Elements of the Whole UWF Project. Electrical/electronical equipment and AIMDs may also be used/worn at these residences, business or community facilities. Worst case increases in magnetic fields will range from 0.01µT to 4.45µT.

There is potential for in-combination effects in Knockmaroe/Knockcurraghbola Crownlands and Knockcurraghbola Commons as outlined at UWF Grid Connection Cumulative Evaluation above. At these residences the cumulative, worst case increase in magnetic fields will be 0.046µT, which will increase ambient magnetic fields at the closest local residences to 0.246µT.

Significance of the Cumulative Impact: Imperceptible to Slight

Rationale for Cumulative Impact Evaluation:

- the Very Low to Low magnitude of the new magnetic fields level in local residences– the new worst case level of magnetic fields will range from 0.13µT to 4.45µT (this value includes the existing ambient level)
- The new levels remain substantially under the EU EMF Limits 100µT for magnetic field exposure.

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

Local Residents & Community

Sensitive Aspect

Cumulative Impact Magnitude:
UWF Related Works and Upperchurch Windfarm cannot have cumulative effects with either Shannonbridge – Killonan 220 kV Overhead Line or with Castlewaller Windfarm, due to the separation distance to these projects.

The potential for cumulative impacts of the Whole UWF Project with Other Projects relates to the combined impact of the UWF Grid Connection 110kV UGC and the existing 220kV OHL and the potential grid connection for the consented Castlewaller Windfarm. The cumulative impact will be in the order to the UWF Grid Connection cumulative impact above – i.e.
The cumulative, worst case increase in magnetic fields when the 110kV UGC is considered with the 220kV OHL will be 0.99µT (i.e. 0.01 + 0.98) at 1 No. residence. The cumulative, worst case increase in magnetic fields when the 110kV UGC is considered with the potential Castlewaller Windfarm grid connection will be 1.64µT at the nearest residents (9m from the 110kV UGC).

Significance of the Cumulative Impact: Imperceptible

Rationale for Cumulative Impact Evaluation:

- the Very Low magnitude of the cumulative magnetic fields level – the cumulative level of magnetic fields will remain under 1.64µT under the worst case scenario (maximum possible power loads) at the closest local residences.
- the cumulative level will be similar to the existing contribution from the 220kV OHL and the potential Castlewaller Windfarm grid connection.
- The new levels remain substantially under the EU EMF Limits 100µT for magnetic field exposure.

Topic: Air

12.2.4.5 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 12-24 below.

Table 12-24: Description and Rationale for Excluded Impacts to Local Residents & Community

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

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
All construction works, personnel and activities	1,2,4	Air, Ground	Increase in ambient electromagnetic fields (EMF) levels	Rationale for Excluding: No Potential for Impacts, The Internal Windfarm Cables, Consented UWF Turbines and Consented UWF Substation, Mountphilips Substation, 110kV UGC, will only create electromagnetic fields during the operation of these parts. No EMF will be emitted during the construction stage.
Road opening, rock breaking, earthmoving, operation of machinery and movement of construction traffic along access roads	1, 2, 4	Air, Ground	Vibration damage to buildings or internal nuisance to residents	Rationale for Excluding: Neutral effects, there will be no sources of significant vibration during the construction stage of the UWF Grid Connection or the UWF Related Works, due to any absence of piling and blasting on site. There will be some vibration emissions from road opening, rock breaking and earthmoving activities, though these vibrations will be at a very low level with expected levels of between 0 and 1 mm/s at 10m distance, this is substantially less than the vibration levels of '8mm/s at frequencies of less than 10Hz, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above' below which even cosmetic damage to buildings can be avoided, and below the lower limit for human tolerance of piling of 2.5mm/s.
Construction Traffic	1,2,4	Wind	Decrease in ambient air quality as a result of traffic derived pollutants (NO2, PM10, PM2.5, CO, Benzene	Rationale for Excluding – Neutral impact: The traffic levels associated with Elements 1, 2, 4 do not reach the criteria outlined in Table 12-4 for carrying out an air modelling assessment for traffic based pollutants as the increase in traffic levels will be less than 1,000 AADT. According to Table 12-7, any small increases in traffic derived pollutants will have a negligible effect in the context of the baseline air quality level of c. 5µg/m^3 (NO2) or 10µg/m^3 (PM10) which is substantially below the objective/limit value of 40µg/m^3 for NO2 and PM10.
Operational Stage				
Operational UWF Grid Connection, UWF Related Works and Upperchurch Windfarm	1, 2, 4	Ground	Vibration emissions during the operational stage	Rationale for Excluding: No potential for impacts, there will be no sources of significant vibration during the operational stage of the UWF Grid Connection or the UWF Related Works, due to any absence of piling, blasting, road opening, rock breaking or earthmoving activities. Vibration from operational plant or from operational vehicles using site access roads will be almost impossible to detect, and will not cause damage to buildings or internal nuisance to residents.

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				In relation to the Upperchurch Windfarm, according to the UWF RFI 2013: "The level of vibration from wind turbines is so small that only the most sophisticated instrumentation and data processing can reveal their presence, and they are almost impossible to detect "The level of vibration from wind turbines is so small that only the most sophisticated instrumentation and data processing can reveal their presence, and they are almost impossible to detect".

Decommissioning Stage

Rationale for Excluding: No potential for effects/Neutral effects, as per

UWF Grid Connection: No potential for effects to Air the UWF Grid Connection will not be decommissioned.

UWF Related Works: Decommissioning of the UWF Related Works is limited to the removal of the Telecom Relay Pole and pulling of cables from ducts (Internal Windfarm Cabling) which will take place either from the Consented UWF Turbines or the Consented UWF Substation. **Neutral effect on air quality**, due to the small extent of decommissioning activities with any dust associated occurring within the immediate vicinity of the works areas and limited use of vehicles. **Neutral effect on ambient noise or vibration levels,** due to the distance (greater than 100m) to any local resident or community facility. There will be **Neutral vibration effects**, as the decommissioning activities will not involve any major sources of vibration. There will be **no potential for ambient EMF level increases** as the cables and electrical plant will have been powered down at the start of the Decommissioning Stage and no EMF will be emitted.

Upperchurch Windfarm: It is likely that the Consented UWF Substation will remain in-situ for use by ESBN and that the Consented UWF Roads will also remain in-situ for use by the landowner. Decommissioning works will be mainly limited to the Consented UWF Turbines, Turbine Hardstanding areas, meteorological masts and associated drainage systems, where the turbines will be removed and the remaining hardstanding areas and associated drainage will be reinstated using the soils in the adjacent storage permanent overburden storage berms, this soil will be reseeded and will re-vegetate quickly, Neutral effects to soils are expected due to the small extent of the hardstands in the context of the abundance of soils in the surrounding area. Upperchurch Windfarm decommissioning works and activities are predominately from turbine hardstands, with works at any one turbine hardstand taking place over c.2 weeks. **Neutral effect on air quality,** due to the small extent of decommissioning activities with any dust associated occurring within the immediate vicinity of the works areas and limited use of vehicles. **Neutral effect on ambient noise or vibration levels,** due to the distance (greater than 100m) to any local resident or community facility. There will be Neutral vibration effects, as the decommissioning activities will not involve any major sources of vibration. There will be **no potential for ambient EMF level increases** as the cables and electrical plant will have been powered down at the start of the Decommissioning Stage and no EMF will be emitted.

12.2.5 Mitigation Measures for Impacts to Local Residents & Community

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

12.2.6 Evaluation of Residual Impacts to Local Residents & Community

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures were required, and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Local Residents & Community above (Section 12.2.4) – i.e. **no significant adverse impacts**.

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

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

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

GC-BPM-08	Minimising Dust Emissions from Site Activities
GC-BPM-10	Measuring Operational EMF Emissions

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

12.2.8 Summary of Impacts to Local Residents & Community

A summary of the Impact to Local Residents & Community is presented in Table 12-25.

Table 12-25: Summary of the impacts to Local Residents & Community

Impact to Local Residents & Community:	**Increase in Airborne Dust**	**Increase in Ambient Noise Levels**	**Increase in Ambient Noise Levels**	**Increase in Ambient EMF Levels**
Evaluation Impact Table	*Section 12.2.4.1*	*Section 12.2.4.2*	*Section 12.2.4.3*	*Section 12.2.4.4*
Project Life-Cycle Stage	Construction	Construction	Operational Stage	Operational Stage
UWF Grid Connection *direct/indirect impact*	**Slight**	**Moderate**	**No Impact**	**Imperceptible**
UWF Grid Connection *Cumulative Impacts*	**Slight**	**Moderate**	**No Impact**	**Imperceptible**
Element 2: UWF Related Works	Slight	Moderate	No Potential for Impact	Imperceptible
Element 3: UWF Replacement Forestry	Neutral Impacts or No Impacts - Evaluated as Excluded, see Section 12.2.2.2.1			
Element 4: Upperchurch Windfarm	No significant Impact	Not be Significant	Moderate (Turbines) No Impact (Substation)	No Impact
Element 5: UWF Other Activities	Neutral Impacts or No Impacts - Evaluated as Excluded, see Section 12.2.2.2.1			
Cumulative Impact:				
All Elements of the Whole UWF Project	**Slight**	**Moderate**	**No Potential for Cumulative Impact**	**Imperceptible to Slight**
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Shannonbridge – Killonan 220kV OHL Castlewaller Windfarm	**No Potential for Impact** - Evaluated as Excluded, see Section 12.2.2.2.1			**Imperceptible**

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

12.3 Sensitive Aspect No.2: Transient People

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

12.3.1 BASELINE CHARACTERISTICS of Transient People

12.3.1.1 STUDY AREA for Transient People

The study area for Transient People in relation to the UWF Grid Connection is described in Table 12-26 and illustrated on Figure GC 12.3: UWF Grid Connection Study Area for Transient People (Volume C3 EIAR Figures).

Table 12-26: UWF Grid Connection Study Area for Transient People

Study Area for Transient People	Justification for the Study Area Extents
Construction Stage Air Quality, Noise and Vibration: Lands, roads and waymarked walking trails within 350m of construction works areas & within 50m of main transport routes used by construction vehicles	Based on Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, and the Guidance on the Assessment of Dust from Demolition and Construction. Based on the Guidelines for the Treatment of Noise and Vibration in National Road Schemes, the Guidelines recommend that receptors within 300m of a route be identified, however in the interest of simplicity, the wider Air Quality study area of 350m from construction works is used in the appraisal.
Operational Stage Noise: Lands, roads and waymarked walking trails within 400m from Mountphilips Substation.	Beyond this distance, there is no potential for any increases in ambient noise levels.
Operational Stage EMF: Lands, roads and waymarked walking trails within 100m from Mountphilips Substation and the 110kV UGC	Based on professional judgement, EMF Field emissions can extend to this distance. At distances greater than 100m, the contribution of the UWF Grid Connection to ambient EMF levels will be extremely low or none, with effects being considered neutral or none

12.3.1.2 Baseline Context and Character of Transient People in the UWF Grid Connection Study Area

Transient People relate to farm/forestry workers and walkers/cyclists who may pass by or momentarily/briefly come within 350m of construction works areas or within 50m of haul routes associated with the project, or within 100m of operational electrical plant, such as underground cables and substations.

Air Quality: Any transient people present within the UWF Grid Connection Study Area, will be within an EPA Air Quality Monitoring Zone D area. Overall, there is a good air quality baseline for the area. Background levels of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) in this area are substantially below the EU limit values.

Noise & Vibration: The study area is considered to be an area with low background noise, with no significant sources of noise. There are no significant sources of vibration in the area either.

Note: Drivers of motorised vehicles are not considered sensitive to either noise or air quality, due to the emission of noise and air pollutants by vehicles and the enclosure of the driver and passengers inside the vehicle.

EMF: Along walking trails and roads, and in fields and forestry, the existing levels of Magnetic field are likely to be less than 0.2 µT at a distance of 30 m away from existing electric infrastructure such as a 38kV line and up to 4µT directly underneath medium voltage overhead lines.

EMF – Electronic Equipment: Artificial Implantable Medical Devices (AIMDs) such as pacemakers which could be worn by transient people on roads, lands and walking routes. Electronic equipment in machinery and vehicles on farmland, forestry and public roads are excluded from further evaluation as they are not commonly susceptible to 50 Hz magnetic fields.

The location of transient people within the UWF Grid Connection Study Area identified in Table 12-27.

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

Project	Transient People within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Transient People within 50m of Materials Haulage Routes (Air Quality)	Transient People within 100m Of Electrical Parts (EMF)
UWF Grid Connection	• Walkers/cyclists on roads along the 110kV UGC or on those parts of the Slievefelim Way and Ormond Way Cycle Route within 350m of the 110kV UGC • Farm and forestry workers on lands within 350m of construction works areas,	• Walkers/cyclists on material haulage routes on the following roads R503, L2166-10, L6013-0, L2156-0, L2157-0, L6009-0, L2264-50, L6188 and the L5337-1.	• All road users on R503, L2166-10, L6013-0, L2156-0, L2157-0, L6009-0, L2264-50 and L6188-within 100m of the 110kV UGC Walkers/cyclists on those parts of the Slievefelim Way and Ormond Way Cycle Route within 100m of the 110kV UGC • Farm and forestry workers on lands within 100m of the Mountphilips Substation and/or the 110kV UGC.

12.3.1.3 Importance of Air (Transient People)

Users of the walking trails in the area expect a high level of amenity and enjoyment. Farm and forestry workers spend the majority of their working day outdoors.

There is a reasonable expectation from all types of transient people for a good level of air quality, and low ambient noise and EMF levels in rural upland areas of Ireland which are remote from busy, congested roads and industrial sources of air pollutants, noise and vibration.

Artificial Implantable Medical Devices (AIMDs) which may be worn by Transient People, such as pacemakers are tested to higher EMF Immunity levels to safeguard operation according to EU regulations (CENELEC 50527-1:2010). A limit of 100 µT applies to 50 Hz magnetic fields and 5000 V/m to 50 Hz electric fields. It should be noted that these are the same limits as the ICNIRP limits adopted by the EU for the general public and used in this chapter of the EIA Report.

12.3.1.4 Sensitivity of Transient People

Air Quality: As per the methodology outlined in Section 12.1.8.1, areas of transient human exposure are considered to be of **low** sensitivity, based on the receptor sensitivity (**low**), the number of receptors (assessed as **'1 or more'** and their distance from the source (**less than 50 m** in worst-case locations), and the assumption based on EPA monitoring that annual mean background level of PM_{10}, are well below the objective limit and

substantially less than 24 µg/m^3, it is considered that sensitivity of transient people to dust soiling or human health effects is considered '**Low**' under the IAQM assessment guidance.

Noise & Vibration: Road users and farm/forestry workers are not considered noise sensitive receptors given their proximity to vehicle, machinery and animals. Construction workers are not sensitive receptors. According to the IEMA 2014 Guidelines, other transient people – walkers and cyclists on waymarked trails - are considered to have a low sensitivity to noise effects.

EMF: Transient People such as farm workers, walkers or road users do not fall under the ICNIRP guideline exposure limits as their time spent in close proximity to the operational Whole UWF Project will typically be limited to momentary or brief periods of time. However, in this EIA Report chapter, any increases in EMF levels, to which Transient People will be exposed, are also evaluated against the 1998 ICNIRP limits. A substantial increase in EMF levels above EU electric and electronic equipment Immunity test levels could cause the malfunction of equipment.

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

Air Quality: If the works do not proceed, the baseline levels of dust including PM_{10} and $PM_{2.5}$ are likely to remain at existing levels. In Ireland the primary sources of Particulate Matter (PM_{10} and $PM_{2.5}$) are vehicular emissions and burning of solid fuels for heating. Due to the nature of the area (remotely populated with no congested roads) PM emissions are unlikely to change dramatically in future years. Small fluctuations are likely in line with previous trends.

Noise: the baseline noise environment at the eastern end of the 110kV UGC has changed in recent years with the commissioning, in 2018, of the Milestone Windfarm, and this trend of wind energy development in the eastern side of the upland area will continue with the construction of the Consented Upperchurch Windfarm. At other locations in the study area there have been no increases or decreases in sources of background noise in the local area.

EMF: Electrical and electronic equipment and radio frequency technology will increasingly become more present in everyday life; the expansion of the power infrastructure in the country is also expected albeit at a much slower rate; however government regulations will ensure EMF levels remain significantly lower than the ICNIRP standard limits.

12.3.1.6 Receiving Environment (the Baseline + Trends)

Air Quality: There are no specific future trends for construction dust emissions in the area of the Whole UWF Project. It is assumed that in relation to dust, the receiving environment will be similar to the baseline environment.

Noise: The baseline environment described above will be the receiving at the time of construction of UWF Grid Connection. The Consented UWF Turbines will not be operational until after the commissioning of both the UWF Grid Connection and Upperchurch Windfarm.

EMF: A continued adoption of electrical and electronic infrastructure and equipment, will increase the background level of EMF at a very slow rate over time. It is not expected for EMF levels to increase significantly above existing average levels of 10V/m or 0.2µT and the receiving environment during the operational stage is assumed to be similar to the baseline environment identified above.

Transient People

Sensitive Aspect

12.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

12.3.2.1 Cumulative Evaluation Study Area

12.3.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

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

UWF Grid Connection Cumulative Evaluation Study Area for Transient People	Justification for the Study Area Extents
Air Quality, Noise & Vibration: Lands, roads and waymarked walking trails within 700m from UWF Grid Connection construction works areas and within 50m from UWF Grid Connection main transport routes, and Operational noise: Lands, roads and waymarked walking trails within 800m of Mountphilips Substation. EMF: Lands, roads and waymarked walking trails within 200m of UWF Grid Connection electrical and communication equipment.	Transient People could potential be effected by dust, noise, vibration and EMF sources from different directions either at the same time or sequentially and therefore the distance from the source was doubled from that used for the UWF Grid Connection (the exception being noise along haulage routes, which remains the same, as cumulative impacts related to any additional traffic on the haul routes).

The study is illustrated on Figure CE 12.3: UWF Grid Connection Cumulative Evaluation Study Area for Transient People

12.3.2.1.2 Whole Project Cumulative Evaluation Study Area

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

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

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 12.3.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements as described in Table 12-28 and illustrated on Figure WP 12.3: Whole Project Study Area for Transient People (Volume C3 EIAR Figures).

Air

Topic

Table 12-28: Cumulative Evaluation Study Area for Transient People

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Air Quality, Noise & Vibration: Lands, roads and waymarked walking trails within 700m from construction works areas and within 100m from main transport routes, and EMF: Lands, roads and waymarked walking trails within 200m of Whole UWF Project electrical and communication equipment.	Transient People could potential be effected by dust, noise, vibration and EMF sources from different directions either at the same time or sequentially and therefore the distance from the source (Whole UWF Project) was doubled from that used for the UWF Grid Connection (alone) (the exception being noise along haulage routes, which remains the same, as cumulative impacts related to any additional traffic on the haul routes).
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm		
Element 5: UWF Other Activities		

12.3.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Transient People also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Transient People with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.25).

The results of this scoping exercise are that: the existing Shannonbridge – Killonan 220 kV OHL, and Killonan – Nenagh 110kV OHL and Castlewaller Windfarm (consented windfarm and potential grid connection); have been scoped in for evaluation of cumulative effects to Transient People.

The location of the Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure WP 12.3.

12.3.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Transient People

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Transient People. The results of this evaluation are included in Table 12-29. The baseline character of the areas around these projects is described in Section 12.3.2.3.

Table 12-29: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	Included for the evaluation of cumulative effects
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: No measureable effect/No potential for effects due to • The planting of the new woodland will have a neutral impact on air quality as works will be carried out by hand using spades, with use of vehicles limited to personnel vehicles and negligible traffic volumes associated with the planting stage. • No potential for adverse air quality impacts during the growth stage, due to the absence of dust creating activities and negligible traffic volumes.

	• There is no potential for noise or vibration effects, as there will be no sources of mechanical noise or vibration because planting will be carried out by hand (Project Design Measure) in grassland fields. • During the growth stage, chainsaws may be used during thinning activities, however this type of activity will be infrequent, brief in nature and at a distance from local residents, therefore it is considered that noise related impacts will be neutral during any thinning activities during the growth stage. • There is no potential for impacts due to EMF emissions as there are no electrical or radio-communication parts associated with the UWF Replacement Forestry.
Element 4: Upperchurch Windfarm	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: Neutral Impacts or No Impacts due to: • Neutral effect on Air Quality - any activities will be of a very short duration, minimal extent and will involve minimal use of vehicles or equipment. • Neutral effect on ambient noise or vibration levels due to the momentary to brief duration of activities at any one location, and the generally low-medium noise levels of the equipment used. Equipment which will be used includes a hedge cutter, tractor, vans, and cable-pullers and hand tools. Activities will take between 15 minutes and 2 days to complete at the various locations Specifically in relation to Haul Route Activities, any noise or vibration emitted by machinery or vehicles used will be in the context of background noise and vibration from regional or national roads or will not be noticeable in the context of local traffic and farming activity. • No potential for increases in ambient EMF levels, as there are no electrical or radio-communication parts associated with the Overhead Line Activities.
Other Projects or Activities	
Shannonbridge – Killonan 220 kV OHL; Killonan – Nenagh 110kV OHL; Castlewaller Windfarm (consented windfarm and potential grid connection);	Yes, included for the evaluation of cumulative effects in relation to EMF effects. Evaluated as excluded in relation to dust, noise or vibration effects, as The potential for cumulative impacts only relates to the potential grid connection and R503 site entrance works. No potential for cumulative impacts with the windfarm, due to separation distance. In relation to the potential grid connection and site entrance works, cumulative construction impacts are not expected as works will either take place at separate times, or should works be carried out at the same time, then works on the grid connection for both projects are likely to be carried out by one crew, with no material cumulative increase in noise or dust, and although a longer construction periods is possible on the local road L6009-0, this will not cause significant effects to road users or workers on adjacent lands, as the works are still temporary and of short duration, during daylight hours. Works at the R503 entrance will not cause cumulative significant impacts to transient people due the very short duration of both 110kV UGC works and the entrance works at the entrance location.

12.3.2.3 Cumulative Information: Baseline Characteristics – Context & Character

Transient People relate to farm/forestry workers and walkers/cyclists who may pass by or momentarily/briefly come within 350m of construction works areas or within 50m of haul routes, or within 100m of operational electrical plant, such as underground cables, substations and wind turbines. Electronic equipment such as Artificial Implanted Medical Devices (AIMDs) may also be worn by Transient People.

Note: Drivers of motorised vehicles are not considered sensitive to either noise or air quality, due to the emission of noise and air pollutants by vehicles and the enclosure of the driver and passengers inside the vehicle.

The potential locations where Transient People may be present within the Whole Project Cumulative Evaluation Study Area are identified in Table 12-28 and illustrated on Figure WP 12.3.

Air Quality: Any transient people present within the Cumulative Evaluation Study Area, will be within an EPA Air Quality Monitoring Zone D area. Overall, there is a good air quality baseline for the area. Background levels of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) in this area are substantially below the EU limit values.

Noise & Vibration: The study area is considered to be an area with low background noise, with no significant sources of noise. There are no significant sources of vibration in the area either.

EMF: Along walking trails and roads, and in fields and forestry, the existing levels of Magnetic field are likely to be less than 0.2 µT at a distance of 30 m away from existing electric infrastructure such as a 38kV line and up to 4µT directly underneath medium voltage overhead lines.

12.3.2.3.1 Element 2: UWF Related Works, Element 4: Upperchurch Windfarm

The potential for Transient People to be within the Whole Project study area for UWF Related Works and Upperchurch Windfarm is outlined in the table below.

Table 12-30: Transient People within the UWF Grid Connection Study Areas

Project	Transient People within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Transient People within 50m of Materials Haulage Routes (Air Quality)	Transient People within 100m Of Electrical Parts (EMF)
UWF Related Works	• Farm and forestry workers on lands within 350m of construction works areas, • Walkers/cyclists on roads within 350m of the 9 No. road crossing locations • Walkers/cyclists on those parts of the Eamonn a Chnoic Loop or Ormond Way Walking Route, or Ormond Way Cycle Route, within 350m of construction works areas	• Walkers/cyclists on material haulage routes on the following local roads: L-4139-0, L-4138-12, L-2264-50, L-6188-0, L-61881-0 and L-6185-13.	• Farm and forestry workers on lands within 100m of the Internal Windfarm Cabling. • Road users within 100m of the 9 No. Internal Windfarm Cabling crossing locations • Walkers/cyclists on those parts of the Eamonn a Chnoic Loop or Ormond Way Walking Route, or Ormond Way Cycle Route, which are within 100m of the Internal Windfarm Cabling.

Project	Transient People within 350m of Construction Works Areas (Air Quality, Noise, Vibration)	Transient People within 50m of Materials Haulage Routes (Air Quality)	Transient People within 100m Of Electrical Parts (EMF)
Upperchurch Windfarm	• Farm and forestry workers on lands within 350m of construction works areas, • Walkers/cyclists on roads within 350m of the 11 no. site entrances, • Walkers/cyclists on those parts of the Eamonn a Chnoic Loop or Ormond Way Walking Route, within 350m of construction works areas	• Walkers/cyclists on material haulage routes on the following local roads: L-4139-0, L-4138-16, L-2264-50, L2264-34, L-6188-0, L-61881-0 and L-6185-13.	• Farm and forestry workers and walkers on lands within 100m of the Consented UWF Substation and Consented UWF Turbines.

Consideration of the Passage of Time: The Ormond Way Cycle Route has been developed since the 2013 Upperchurch Windfarm planning application, and the Ormond Way Walking Route is currently under development. The cycle route passes construction works areas in Knockmaroe. The preliminary route of the Ormond Way Walking similar to the Eamonn a Chnoic is partially routed through the windfarm. The evaluations in this EIAR take account of these additional waymarked trails.

12.3.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 12.3.2.2.1

12.3.2.3.3 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 12.3.2.2.1

12.3.2.3.4 Other Projects or Activities

Farm or forestry workers or road users may be present within 100m of both the UWF Grid Connection and the Shannonbridge – Killonan 220kV OHL:, or the Killonan – Nenagh 110kV OHL.

Farm or forestry workers or road users may be present within 100m of the potential Castlewaller Windfarm grid connection works on the L6009-0.

12.3.3 PROJECT DESIGN MEASURES for Transient People

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

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

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

The Project Design Measures outlined in Table 12-22 are relevant to the Environmental Factor, Air, and in particular to the sensitive aspect **Transient People**.

Table 12-31: UWF Grid Connection Project Design Measures relevant to Transient People

PD ID	Project Design Environmental Protection Measure (PD)
PD04	All construction works will be carried out during daylight hours.
PD07	110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads.

12.3.4 EVALUATION OF IMPACTS to Transient People

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

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

Table 12-32: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Increase in ambient EMF levels (Operational Stage)	*Increase in ambient electromagnetic fields (EMF) levels (construction stage)*
	Vibration nuisance (construction stage)
	Decrease in ambient air quality as a result of traffic derived pollutants (NO_2, PM_{10}, $PM_{2.5}$, CO, Benzene) (construction stage)
	Increase in Airborne Dust (construction stage)
	Increase in ambient noise levels (construction stage)
	Increase in ambient noise levels (operational stage)
	Vibration emissions during the operational stage (operational stage)
	Decommissioning Effects

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following section 12.3.4.1.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 12.3.4.2.

12.3.4.1 Impact Evaluation Table: Increase in Ambient EMF Levels

Impact Description	
Project Life Cycle Stage:	Operational stage
Impact Source: Mountphilips Substation, 110kV UGC, Cumulative Impact Source: Internal Windfarm Cabling (UWF Related Works), 110kV Overhead line, 220kV Overhead line, Castlewaller Windfarm potential grid connection. Impact Pathway: Air/Ground Impact Description: There will be some increase in electromagnetic field levels in locations which are within 100m of electrical or communication parts. AIMDs worn by people also has potential to be affected by increased EMF. Details of the modelling of worst case EMF emissions are included in Appendix 12.3: Explanation and Modelling of Electromagnetic Fields. Impact Quality: Negative	
Evaluation the Subject Development Impact – Increase in ambient EMF levels	
Element 1: UWF Grid Connection - direct/indirect impact	
Impact Magnitude: Mountphilips Substation: Any farm or forestry workers present within 100m of the Mountphilips Substation will be exposed to increased ambient electric and magnetic fields levels within 100m of the substation, which were modelled as 40V/m and 1µT under worst case scenario conditions at the substation fence. AIMD worn by Transient People will also be exposed to increased magnetic field levels. 110kV UGC: Any farm or forestry works, walkers, cyclists on/users of waymarked trails (Slievefelim Way and Ormond Way Cycle), or road users on public roads within 100m of the 110kV UGC will be exposed to increased magnetic field levels. AIMD worn by Transient People will also be exposed to increased magnetic field levels. The worst case levels of 54µT magnetic field will be directly over the 110kV. Levels of EMF drop off quickly with distance and at 5m, 10m, 25m and 50m from the 110kV UGC, the worst case magnetic field levels will be 4.45µT, 1.16 µT ,0.19µT and 0.05µT, respectively. 110kV UGC: No increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the concrete and earth (backfill) materials above the cables. Magnitude Result: Low & Very Low in relation to electric fields, Medium in relation to magnetic fields.	
Significance of the Impact: Imperceptible to Slight	
Rationale for Impact Evaluation: • The Low magnitude of the worst-case increased electric fields of 40V/m at the Mountphilips Substation • the Very Low magnitude of the increased magnetic fields of 1µT at the Mountphilips Substation • the Medium magnitude of the increased magnetic fields above the 110kV UGC, of 54µT. • the momentary to brief exposure of any transient people present • the occasional nature of any exposure • the reversibility of the exposure as the person moves away from the location of the underground cables • The new levels will remain substantially under the EU EMF Limits	
Element 1: UWF Grid Connection – cumulative impact	
Cumulative Impact Magnitude: Cumulative impacts only relate to public roads, waymarked cycle routes, waymarked walking routes, and agricultural and forestry lands (where farm and forestry workers may be present). AIMD worn by Transient People will also be exposed to increased magnetic field levels.	

Transient People

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In relation to cumulative effects with Other Elements of the Whole UWF Project, Transient People could be:

- within 100m of both the UWF Grid Connection 110kV UGC and the UWF Related Works Internal Windfarm Cabling and in Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons, where the worst case levels will be 55.8 µT directly over the two trenches; or
- within 100m of the UWF Grid Connection 110kV UGC and the UWF Related Works Internal Windfarm Cabling and Consented UWF Substation, in Knockcurraghbola Commons, where worst case cumulative increases in ambient magnetic fields will be 1µT in close proximity to both underground cables and near the substation fence.

In relation to cumulative effects with Other Projects:

- The worst case combination ambient magnetic field levels for transient people which are within 100m of both the 110kV UGC and the potential Castlewaller Windfarm grid connection **or** within 100m of both the 110kV UGC and the 110kV OHL **or** within 100m of both the 110kV UGC and the 220kV OHL would be 56.7µT, 69µT and 79.7µT respectively, at the points directly above the potential Castlewaller Windfarm grid connection, directly above the 110kV UGC and directly under the OHLs.
- On the local road, which is passes under the 220kV OHL, the worst case levels are 25.7µT magnetic field and 3.5 kV/m electric field, but this point is greater than 100m from the 110kV UGC, and the 110kV UGC will not contribute to increased magnetic fields at this location.
- There are no cumulative electric field levels as the 110 kV UGC does not contribute to the ambient Electric field. There is also no cumulative associated with the electrical equipment in the Mountphilips Substation compound, as the compound is greater than 100m from either the 110kV or 220kV OHLs, and from the potential Castlewaller Windfarm grid connection.

Magnitude Result: Low in relation to electric fields, Medium in relation to magnetic fields.

Significance of the Cumulative Impact: ranging from Imperceptible to Slight

Rationale for Cumulative Impact Evaluation:

- the Medium magnitude of the increased magnetic fields which will be greatest above the 110kV UGC and Internal Windfarm Cable, of 55.8µT.
- the Medium cumulative magnitude of magnetic fields at Mountphilips of 69 µT and 79.7 µT over the 110kV UGC and under the 110kV OHL and the 220kV OHL, respectively
- the Medium cumulative magnitude of magnetic fields along the L6009-0 of 56.7 µT above both the 110kV UGC and potential Castlewaller Windfarm grid connection;
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure,
- the reversibility of the exposure as the person moves away from the location of the underground cables, turbines or substation.
- The new levels remain substantially under the EU EMF Limits.

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

Element 2: UWF Related Works

Impact Magnitude: Any farm or forestry works, walkers and cyclists, or road users on public roads within 100m of the operational Internal Windfarm Cables will be exposed to increased magnetic field levels. AIMD worn by Transient People will also be exposed to increased magnetic field levels. The worst case levels of magnetic field will be directly over the Internal Windfarm Cables and will be 7.6 µT. Levels of EMF drop off quickly with distance and at 30m of the Internal Windfarm Cable, the worst case magnetic field levels will be 0.03 µT.

No increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the earth (backfill) materials above the cables.
Magnitude Result: Very Low

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

Air

Topic

• the Very Low magnitude of the increased magnetic fields of 7.6µT • No increase in electric fields • the momentary to brief exposure of any transient people present • the occasional nature of any exposure • the reversibility of the exposure as the person moves away from the location of the underground cables • The new levels remain substantially under the EU EMF Limits.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 12.3.2.2.1*
Element 4: Consented Upperchurch Windfarm
Impact Magnitude: Consented UWF Substation: Any farm or forestry workers present within 100m of the Consented UWF Substation will be exposed to increased ambient electric and magnetic fields levels, which were modelled as 40V/m and 1µT under worst case scenario conditions. AIMD worn by Transient People will also be exposed to increased magnetic field levels. Consented UWF Turbines: Any farm or forestry workers, walkers on/users of waymarked trails (Ormond Way Walking trail and Eamonn a Chnoic Loop) present within 5m of the Consented UWF Turbines will be exposed to increased ambient magnetic fields levels, which were researched and calculated as 0.2 µT under worst case scenario conditions. Magnitude Result: Very Low, Low
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • The Low magnitude of the worst-case increased electric fields of 40V/m at the Consented UWF Substation, • the Very Low magnitude of the increased magnetic fields of 1µT at the Consented UWF Substation • the Very Low magnitude of the increased magnetic fields beside the Consented UWF Turbines of 0.2µT • the momentary to brief exposure of any transient people present • the reversibility of the exposure as the person moves away from the location of the underground cable
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 12.3.2.2.1*
Cumulative Information: Individual Evaluations of Other Projects or Activities
Other Project: Shannonbridge – Killonan 220 kV OHL
Impact Magnitude: Any farm workers, walkers, cyclists or other road users within 100m of the existing overhead lines will be exposed to increased magnetic and electric field levels. The worst case levels associated with this OHL will be directly underneath the 220kV lines, with worst case magnetic fields of 25.7 µT and electric fields of 3.5 kV/m in relation to the 220kV OHL. Magnitude Result: Medium
Significance of the Impact: Imperceptible to Slight
Rationale for Impact Evaluation: • the Medium magnitude of the existing magnetic and electric fields of 25.7 µT and 3.5 kV/m • the momentary to brief exposure of any transient people present • the occasional nature of any exposure • The new levels remain substantially under the EU EMF Limits.
Other Project: Killonan – Nenagh 110kV OHL
Impact Magnitude: Any farm workers within 100m of the existing overhead lines will be exposed to increased magnetic and electric field levels. The worst case levels associated with this OHL will be directly underneath the 110kV lines, with worst case magnetic fields of 15 µT and electric fields of 1.3 kV/m. Magnitude Result: Medium
Significance of the Impact: Imperceptible to Slight

Transient People

Sensitive Aspect

Rationale for Impact Evaluation:
- the Medium magnitude of the existing magnetic and electric fields of 15 µT and 1.3 kV/m
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure

The new levels remain substantially under the EU EMF Limits.

Other Project: Castlewaller Windfarm (potential grid connection)

Impact Magnitude: Any farm or forestry works, walkers and cyclists, or road users on public roads within 100m of the Potential Castlewaller Windfarm Grid Connection will be exposed to increased magnetic field levels. AIMD worn by Transient People will also be exposed to increased magnetic field levels. The worst case levels of magnetic field will be directly over the UWF Grid Connection 110kV UGC and the potential Castlewaller Windfarm grid connection, which will be 56.7 µT. Levels of EMF drop off quickly with distance and at 30m the worst case magnetic field levels will be 0.19 µT.

No increase in electric fields will occur due to the complete screening of these fields by both the metallic sheath surrounding the cables and the earth (backfill) materials above the cables.
Magnitude Result: Very Low

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
- the Very Low magnitude of the increased magnetic fields of 56.7µT
- No increase in electric fields
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure
- the reversibility of the exposure as the person moves away from the location of the underground cables

The new levels remain substantially under the EU EMF Limits.

Evaluation of Other Cumulative Impacts – Increase in ambient EMF levels

Whole UWF Project Effect

Cumulative Impact Magnitude:
The extent of the whole project impact is the increase in ambient EMF at both substations, over/close to 110kV underground cables, Internal windfarm cables, and also at Consent UWF Turbine locations. Any farm or forestry works, or walkers or cyclists on waymarked trails will be exposed to increased levels of EMF. AIMD worn by Transient People will also be exposed to increased magnetic field levels.

The worst case possible increases in ambient electric and magnetic fields levels of 40V/m and 1µT under worst case scenario conditions at the substation fences, increases of 54µT in magnetic fields directly over the 110kV UGC, 7.6 µT increases in magnetic fields directly over the Internal Windfarm Cabling, and 0.2 µT increases in magnetic fields right beside the turbine bases.

The worst case in-combination effect will be directly over the 110kV UGC and Internal Windfarm Cabling trenches, which are located in the same area in Knockmaroe (on the L2264-50), and on the private paved road in Knockcurraghbola Crownlands near the Consented UWF Substation, where worst case levels will be 55.8 µT. No in combination effects of Elements of the Whole UWF Project will occur at any other location and any increases in electric or magnetic fields will be as described above.

Magnitude Result: Very Low, Low, Medium

Significance of the Cumulative Impact: ranging from **Imperceptible to Slight** for people**, Slight** for AIMDs

Rationale for Cumulative Impact Evaluation:
- The Low magnitude of the worst-case increased electric fields of 40V/m at the 110kV substations
- the Very Low magnitude of the increased magnetic fields of 1µT at the 110kV substations

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- the Medium magnitude of the increased magnetic fields above the 110kV UGC and Internal Windfarm Cable, of 55.8µT.
- the Low magnitude of the increased magnetic fields beside the Consented UWF Turbines and over an internal windfarm cable of 7.8 µT
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure,
- the reversibility of the exposure as the person moves away from the location of the underground cables
- The new levels remain substantially under the EU EMF Limits.

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

Cumulative Impact Magnitude: Cumulative impacts with Other Projects only relates to UWF Grid Connection, as described above (UWF Grid Connection – cumulative impacts), and copied hereunder:

110kV UGC and 220kV OHL or 110kV OHL:
The worst case combination ambient magnetic field levels for transient people which are within 100m of both the 110kV UGC and the 110kV OHL **or** within 100m of both the 110kV UGC and the 220kV OHL would be 69µT and 79.7µT respectively, at the points directly above the 110kV UGC and directly under the OHLs.

On the local road, which is passes under the 220kV OHL, the worst case levels are 25.7µT magnetic field and 3.5 kV/m electric field, but this point is greater than 100m from the 110kV UGC, and the 110kV UGC will not contribute to increased magnetic fields at this location.

110kV UGC and potential Castlewaller Windfarm grid connection:
The worst case combination ambient magnetic field levels for transient people which are within 100m of both the 110kV UGC and the potential Castlewaller Windfarm grid connection would be 56.7µT, at the points directly above both grid connections on the L6009-0.

There are no cumulative electric field levels as the 110 kV UGC does not contribute to the ambient Electric field. There is also no cumulative associated with the electrical equipment in the Mountphilips Substation compound, as the compound is greater than 100m from either the 110kVs or 220kV OHL.

Significance of the Cumulative Impact: Imperceptible to Slight

Rationale for Cumulative Impact Evaluation:

- the Medium cumulative magnitude of magnetic fields at Mountphilips of 56.7 µT, 69 µT and 79.7 µT above the 110kV UGC, under the 110kV OHL and the 220kV OHL, respectively
- the momentary to brief exposure of any transient people present
- the occasional nature of any exposure
- the reversibility of the exposure as the person moves away from the location of substations and the underground cables or overhead lines.
- The new levels remain substantially under the EU EMF Limits.

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12.3.4.2 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 12-32 below.

Table 12-33: Description and Rationale for Excluded Impacts to Transient People

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

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
All construction works, personnel and activities	1,2,4	Air, Ground	Increase in ambient electromagnetic fields (EMF) levels	Rationale for Excluding: No Potential for Impacts, the Mountphilips Substation, 110kV UGC, Internal Windfarm Cables, Consented UWF Turbines and Consented UWF Substation will only create electromagnetic fields during the operation of these parts. No EMF will be emitted during the construction stage.
Road opening, rock breaking, earthmoving, operation of machinery and movement of construction traffic along access roads	1, 2, 4	Air, Ground	Vibration nuisance	Rationale for Excluding: No Potential for Impacts, ttransient people are not considered sensitive to vibration emissions at the levels which could be emitted during construction works and by construction machinery.
Construction Traffic	1,2,4	Wind	Decrease in ambient air quality as a result of traffic derived pollutants (NO_2, PM_{10}, $PM_{2.5}$, CO, Benzene	Rationale for Excluding: Neutral impact, the traffic levels associated with the UWF Grid Connection or the Other Elements of the Whole UWF Project do not reach the criteria outlined in Table 12-4 for carrying out an air modelling assessment for traffic based pollutants as the neither the individual nor in-combination increase in traffic levels will be less than 1,000 AADT. According to Table 12-7, any small increases in traffic derived pollutants will have a negligible effect in the context of the baseline air quality level of c. 5µg/m^3 (NO_2) or 10µg/m^3 (PM_{10}) which is substantially below the objective/limit value of 40µg/m^3 for NO_2 and PM_{10}.
Delivery of construction materials Excavation and storage of materials	1, 2, 4	Wind	Increase in airborne dust	Rationale for Excluding: Neutral impact, due to a Low receptor sensitivity, a Low sensitivity of the area (of walking routes, public roads or agricultural/forestry lands), combined with the medium magnitude of construction activities, it is considered that the risk of dust effects to Transient People is Low, furthermore the duration of any effects will be momentary to brief in duration.

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Delivery of construction materials Excavation and storage of materials	1, 2, 4	Wind	Increase in ambient noise levels	Rationale for Excluding: Neutral impact, as per the IEMA 2014 transient people are considered to have a Low sensitivity to noise effect, any walkers or cyclists will only momentarily encounter construction works at four locations where waymarked trails come into close proximity with construction works areas. In addition, there will be no unauthorized access by transient people to construction works areas.
Operational Stage				
Operational substations, operational turbines	1,4	Air	Increase in ambient noise levels	Rationale for Excluding: no potential for impacts/Neutral impacts: once constructed, noise emissions from the operational Mountphilips Substation or the Consented UWF Substation will not be audible at distances beyond 200m. As there are no waymarked trails within this distance, there is no potential for impacts to Transient People (Road users and farm/forestry workers are not considered noise sensitive receptors given their proximity to vehicle, machinery and animals). In relation to Other Elements, the Eamonn a Chnoic Loop is routed in close proximity to turbines in Knocknamena, however it is considered that while the noise emitted by the turbines will be heard in close proximity, this noise will not be intrusive – the levels will not cause any change in behaviour, such as having to speak more loudly as a conversation can be carried out normally while standing underneath a turbine. In the context of the momentary/brief duration of any effects, it is considered that the noise emitted by the Consented Upperchurch Turbines will have a neutral effect on any walkers that may be on this looped walk.
Operational UWF Grid Connection, UWF Related Works and Upperchurch Windfarm	1, 2, 4	Ground	Vibration emissions during the operational stage	Rationale for Excluding**:** No potential for impacts, there will be no sources of significant vibration during the operational stage of the UWF Grid Connection or the UWF Related Works, due to any absence of piling, blasting, road opening, rock breaking or earthmoving activities. Vibration from operational plant or from operational vehicles using site access roads will be almost impossible to detect. In relation to the Upperchurch Windfarm, according to the UWF RFI 2013: "The level of vibration from wind turbines is so small that only the most sophisticated instrumentation and data processing can reveal their presence, and they are almost impossible to detect
Decommissioning Stage				

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

Rationale for Excluding: No potential for effects/Neutral effects:

UWF Grid Connection: No potential for effects to Air: The UWF Grid Connection will not be decommissioned and therefore there is no potential for effects to air quality or to ambient noise, vibration or EMF levels.

UWF Related Works: Decommissioning of the UWF Related Works is limited to the removal of the Telecom Relay Pole and pulling of cables from ducts (Internal Windfarm Cabling) which will take place either from the Consented UWF Turbines or the Consented UWF Substation. Neutral effect on air quality, due to the small extent of decommissioning activities with any dust associated occurring within the immediate vicinity of the works areas and limited use of vehicles. Neutral effect on ambient noise or vibration levels, due to momentary to brief duration of any increase in ambient noise experience by any walkers that may be presented on the Eamonn a Chnoic Loop or Ormond Way (if developed) where they comes in close proximity to the Upperchurch Windfarm. There will be Neutral vibration effects, as the decommissioning activities will not involve any major sources of vibration. No potential for impact ambient EMF levels: no EMF will be emitted as the cables and electrical plant will have been powered down at the start of the Decommissioning Stage.

Upperchurch Windfarm; Neutral impact –It is likely that the Consented UWF Substation will remain in-situ for use by ESBN, decommissioning works will be limited to the Consented UWF Turbines, turbine hardstanding areas, meteorological masts and associated drainage systems, where the turbines and will be removed and the remaining hardstanding areas and associated drainage will be reinstated using the soils in the adjacent storage permanent overburden storage berms, this soil will be reseeded and will re-vegetate, Neutral effects to soils are expected due to the small extent of the hardstands in the context of the large extent of soils in the surrounding area. Upperchurch Windfarm decommissioning works and activities are predominately from turbine hardstands, with works at any one turbine hardstand taking place over c.2 weeks. Neutral effect on Air Quality, due to the small extent of decommissioning activities with any dust associated occurring within the immediate vicinity of the works areas and limited use of vehicles. Neutral effect on ambient noise or vibration levels**,** due to the momentary to brief duration of any increase in ambient noise experience by any walkers that may be presented on the Eamonn a Chnoic Loop or Ormond Way where they comes in close proximity to the Upperchurch Windfarm. There will be Neutral vibration effects, as the decommissioning activities will not involve any major sources of vibration. No potential for impact ambient EMF levels: no EMF will be emitted as the cables and electrical plant will have been powered down at the start of the Decommissioning Stage.

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12.3.5 Mitigation Measures for Impacts to Transient People

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

12.3.6 Evaluation of Residual Impacts to Transient People

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures were required, and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Transient People above (Section 12.3.4) – i.e. **Neutral Impacts/No Likely Impacts**.

12.3.7 Application of Best Practice and the EMP for Transient People

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

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

GC-BPM-08	Minimising Dust Emissions from Site Activities
GC-BPM-10	Measuring Operational EMF Emissions

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

12.3.8 Summary of Impacts to Transient People

A summary of the Impact to Transient People is presented in Table 12-33.

Table 12-34: Summary of the impacts to Transient People

Impact to Transient People:	**Increase in Ambient EMF Levels**
Evaluation Impact Table	*Section 12.3.4.1*
Project Life-Cycle Stage	Operational Stage
UWF Grid Connection *direct/indirect impact*	**Imperceptible to Slight**
UWF Grid Connection *cumulative impact*	**Imperceptible to Slight**
Element 2: UWF Related Works	Imperceptible
Element 3: UWF Replacement Forestry	Neutral Impacts or No Impacts - Evaluated as Excluded, see Section 12.3.2.2.1
Element 4: Upperchurch Windfarm	Imperceptible
Element 5: UWF Other Activities	Neutral Impacts or No Impacts Evaluated as Excluded, see Section 12.3.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	**Imperceptible to Slight (for people) Slight (for AIMDS)**
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Shannonbridge – Killonan 220 kV OHL; Killonan – Nenagh 110kV OHL; Castlewaller Windfarm (potential grid connection)	**Imperceptible to Slight**

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

12.4 Reference List

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