UWF Grid Connection

EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 5: Description of the Development – UWF Grid Connection

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List of Abbreviations

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

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

Glossary of Terms

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

Executive Summary - Description of the Development

UWF Grid Connection: Location and Characteristics

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

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

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

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

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

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

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

Mitigation Measures

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

The project design environmental protection measures will be implemented through the Environmental Management Plan. The EMP will be an important contract document for the main construction contractor (Contractor) who will be contractually obliged to comply with the EMP. An Environmental Clerk of Works will be appointed, who will be independent of the construction Contractor, and it will be the responsibility of the

Environmental Clerk of Works to monitor the compliance of the Contractor with the EMP through liaising with the Construction Site Manager and the Project Manager, monitoring construction works on a daily basis and by carrying out regular audits on EMP compliance.

UWF Grid Connection: Construction & Operation

UWF Grid Connection Construction Phase

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

UWF Grid Connection Operational Phase

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

UWF Grid Connection Use of Natural Resources

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

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

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

UWF Grid Connection Emissions

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

UWF Grid Connection Waste

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

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

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

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

Other Projects Considered

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

Off-Site Project - The Whole UWF Project

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

Secondary Projects

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

Other Projects or Activities

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

5 Description of Development - UWF Grid Connection

5.1 Introduction to Chapter 5

5.1.1 Overview and Purpose of UWF Grid Connection

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

UWF Grid Connection comprises two main parts;

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

5.1.1.1 Changes in this 2019 Application from the 2018 Application

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

- In this 2019 Application, the route of the 110kV UGC from Mountphilips Substation Site entrance to the Consented Upperchurch Substation site is wholly under the public road (except for 700m under a private paved road at the Upperchurch Windfarm Substation end) and is 30.5km in length. By comparison, the 2018 Application 110kV UGC route was through agricultural and forestry tracks and lands with some public road crossings and 27.5km in length.

- Mountphilips Substation is at the same location, but the footprint of the Substation Compound is increased by 15% (from 8930m^2 to 10290m^2) and the footprint of the control building is increased from 205m^2 to 375m^2. This is to reflect new layout requirements in Eirgrid Specifications for a loop substation (such as Mountphilips Substation). The expansion of the substation footprint will result in;

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

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

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

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

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

5.1.2 Layout of this Chapter 5

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

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

5.2 Characteristics of UWF Grid Connection

5.2.1 Location of UWF Grid Connection

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

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

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

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

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

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

Relevant Figures: Volume C3 EIAR Figures

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

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

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

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

5.2.2 Size and Design of UWF Grid Connection

5.2.2.1 Mountphilips Substation

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

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

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

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

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

Relevant Volume C3 EIAR Figures:

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

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

Relevant Volume C4 EIAR Appendices

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

5.2.2.2 Ancillary Works at Mountphilips Substation Site

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

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

Relevant Volume C4 EIAR Appendices

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

5.2.2.2.1 Temporary Construction Compound

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

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

Relevant Volume C3 EIAR Figures:

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

Relevant Volume C4 EIAR Appendices

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

5.2.2.2.2 New Permanent Entrance at Coole townland

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

Relevant Volume C3: EIAR Figures

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

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_08: Permanent Site Entrance at Mountphilips Substation Site

5.2.2.2.3 New Permanent Access Road at Mountphilips Substation site

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

Relevant Volume C3: EIAR Figures

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

Figure GC 5.10: Cross Sections of the New Permanent Access Road to Mountphilips Substation

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_06: New Permanent Access Road at Mountphilips Substation

5.2.2.2.4 Temporary Works to facilitate the construction of the End Masts

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

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

Relevant Volume C3: EIAR Figures

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

Figure GC 5.11: Cross Section of Temporary Access Road at Mountphilips Substation

5.2.2.2.5 Drainage Systems at the Mountphilips Substation site

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

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

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

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

5.2.2.2.6 Watercourse Crossings at the Mountphilips Substation site

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

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

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

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

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

Relevant Volume C3 EIAR Figures:

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

Relevant Volume C4 EIAR Appendices

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

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

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

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

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

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

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

Relevant Volume C4 EIAR Appendices

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

5.2.2.2.8 Fencing at the Mountphilips Substation site

Fencing will be erected at the Mountphilips Substation site per;

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

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

5.2.2.2.9 Provision of electricity supply to Mountphilips Substation

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

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

5.2.2.2.10 Storage of Excavated Materials at the Mountphilips Substation site

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

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

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

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

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

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_10: Formation of Overburden Storage Berms at Mountphilips Substation site

5.2.2.2.11 Reinstatement of Lands at the Mountphilips Substation site

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

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

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

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

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_11: Reinstatement of Lands at Mountphilips Substation Site

5.2.2.3 Mountphilips – Upperchurch 110kV UGC

5.2.2.3.1 Location of the 110kV UGC

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

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

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

Relevant Volume C3 EIAR Figures

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

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

5.2.2.3.2 The 110kV UGC Trench, Cables and Joint Bays

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

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

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

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

Relevant Volume C3 EIAR Figures:

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

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

Figure GC 5.15: Views of 110kV UGC Joint Bays

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_12: 110kV Trenching & Ducting

GC_OCM_13: 110kV Joint Bays and Associated Chambers

GC_OCM_14: 110kV Cable Pulling

GC_OCM_15: 110kV Cable Jointing

5.2.2.3.3 Watercourse Crossing Works for the 110kV UGC

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

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

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

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

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

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

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

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

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

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

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

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

Replacing Existing Culverts: At the remaining 13 No. locations, at W13, W14, W15, W17, W19, W20, W32, W34, W55, W57, W60, W61 and W64, there is not sufficient cover over the culvert, and the cabling will have to be installed under the structure. All of these culverts are old masonry culverts, and may need to be replaced during the works. For the purposes of this EIA Report, it is evaluated as a worst case scenario that all 13 No. culverts will be replaced. While these works will include instream works to some degree, they are called 'Culvert Replacement Works' throughout the EIA Report to distinguish them from the works at W1, W2 and W3 at Mountphilips Substation site. The works at W1, W2 and W3 are referred to as 'instream works' throughout.

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

Relevant Volume C3 EIAR Figures:

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

Relevant Volume C4 EIAR Appendices:

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

5.2.2.3.4 Road / Lane Closures along the Public Road Network

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

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

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

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

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

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

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

Relevant Volume C3 EIAR Figures:

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

5.2.2.3.5 Disposal of Spoil from Public Road Excavations Trenches

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

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

5.2.2.3.6 Reinstatement of Public Roads

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

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

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

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

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

Relevant Volume C3 EIAR Figures:

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

5.2.2.3.7 Phasing of the Works

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

5.2.2.3.8 Supervision of Road Works

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

5.2.2.3.9 Existing Underground Services along the 110kV UGC

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

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

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

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

Relevant Volume C3 EIAR Figures:

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

5.2.3 Environmental Protection Measures (Mitigation Measures)

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

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

PD ID	UWF Grid Connection Project Design Environmental Protection Measure (PD)
PD01	UWF Grid Connection construction works during the Hen Harrier breeding season (March to August inclusive) will only take place at the Mountphilips Substation Site; construction of the 110kV UGC between the Mountphilips Substation site and the Consented UWF Substation compound will be carried out during the months of September to February inclusive.
PD02	If works at Mountphilips Substation site are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory Hen Harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the entire construction works area boundary. These surveys will be completed prior to the start-up of all construction activities. No works will take place within 2 km of any identified active Hen Harrier nest during the hen harrier breeding season.
PD03	Although no hen harrier roosts are currently known to occur within 1km of UWF Grid Connection, confirmatory surveys will be completed to record any roosting locations within 1km of UWF Grid Connection. Should a hen harrier roost occur within 1km of UWF Grid Connection works, then construction works within 1km of a roost will be limited to the period between 'one hour after sunrise' to 'one hour before sunset' during the Hen Harrier roosting season (October to February inclusive).
PD04	All construction works will be carried out during daylight hours.
PD05	At the Mountphilips Substation site, construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted. A speed limit of 25km/hr for all traffic/machinery will be implemented at the Mountphilips Substation site. Outside of Mountphilips Substation site, all construction will be restricted to the paved road surfaces or built surfaces along the 110kV UGC. A speed limit of 50km/hr for all delivery and construction traffic will be implemented on Local Roads ('L' roads).
PD06	Construction works will not be carried out within 150m of Rear Cross National School or Lackamore National School, during school hours. In addition, the project Community Liaison Officer will keep each school informed of construction timetables and scheduling.
PD07	110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads.
PD08	Confirmatory consultations with Irish Water, Eir and ESB and review of all relevant infrastructure mapping before works, along with confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a banksman will accompany each excavator to oversee all excavation works.

PD09	Close contact with the local Newport Regional Supply office at Newross will be maintained by the Environmental Clerk of Works throughout the construction of the 110kV UGC. The Environmental Clerk of Works will keep the Newport Regional Water Supply office up-to-date with the location and schedule of works. To reduce risk of damaging water mains; pre-construction confirmatory surveys will be carried out, and excavations will be hand dug within 500mm of pipes. So that any damage (should it occur) can be fixed immediately, a supply of water mains repair materials will be kept at the Mountphilips Substation compound and at each works location on the public road network.
PD10	Flag-men will be used at 110kV UGC works locations on the public roads subject to one lane closures. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the public road network in a in a safe and efficient manner. The works will be carried out according to the Traffic Management Plan for UWF Grid Connection. The Traffic Management Plan forms part of the Environmental Management Plan.
PD11	Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m.
PD12	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town.
PD13	As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the Promoter will fund the costs of Tipperary County Council engaging a chartered Civil Engineer to oversee quality control and compliance with drawings, specifications and road opening conditions for the duration of the works
PD14	All initial groundworks within 500m of an RMP or NIAH site, will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works.
PD15	Where excavations occur at culvert replacement locations along the 110kV UGC, and at the 3 No. new watercourse crossing at the Mountphilips Substation site, excavations will be monitored by an appropriately qualified archaeologist under license from the National Monuments Service, the excavated material will be examined for any evidence of archaeological material and metal detected as part of a finds retrieval strategy.
PD16	No refuelling of plant or equipment will be permitted within 100m of identified water supply wells
PD17	At Mountphilips Substation, water for operational stage welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site.
PD18	The new substation compound and the new permanent access road at the Mountphilips Substation site will have a permanent surface water drainage network in place which will include

	check dams. These check dams will allow the settlement of suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD19	At Mountphilips Substation location, where dewatering of trenches or excavations is required, there will be no direct discharge of untreated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate to the volume of water requiring treatment (if any) to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD20	At Mountphilips Substation site, all excavated material will be removed for temporary or permanent storage at designated berms, which will be located more than 25m away from the watercourses on Mountphilips Substation site. All storage berms will be graded and sealed following emplacement. The berms will be covered if there is a risk of erosion. Temporary silt control methods such as silt fencing will be placed around all overburden storage areas. The existing vegetative buffer between the berms and the nearest watercourses will be maintained and no works will occur in the buffer zone.
PD21	At Mountphilips Substation site, the permanent storage berms will be along the new access road and around the substation compound will be planted with local provenance native fruiting hedge species, with grasses and native flower species common to the surrounding vegetation sown along the sides of the berms. Local provenance native wildflower seed of flowering plants like clovers, vetches and knapweed will be included. Revegetation works will take place at the soonest practicable opportunity after emplacement.
PD22	Outside of the Mountphilips Substation site, there will be no storage of overburden and all excavations from road trenches will be removed to licensed waste facilities in accordance with the UWF Grid Connection Waste Management Plan. Loads of excavated material will be covered during transportation to prevent spillages of excavated material.
PD23	All Joint Bays for the 110kV UGC will be located at least 50m from a Class 1 or Class 2 watercourse and at least 25m from Class 3 or Class 4 watercourses.
PD24	Outside of the Mountphilips Substation site, where dewatering of trenches or excavations is required for the 110kV UGC, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag to ensure there is no exceedance of the criteria listed in Schedule 5 and Schedule 6 of the EC Environmental Objectives Surface Water Regulations 2009 (as amended) and will ensure that the water quality status in downstream waterbodies are maintained in accordance with the Surface Water Regulations 2009.
PD25	Construction works along the 110kV UGC route will cease during heavy or prolonged rainfall events, and any open trenches or excavations will be covered. Use of weathering forecasting will be undertaken in advance of works.
PD26	A phased approach will be undertaken in relation to excavations, excavation dewatering and any culvert replacement works, where these works occur within 50m of a watercourse. The phased approach will only permit one of main potential sediment producing activities (i.e. excavations, excavation dewatering or culvert replacement works), to be carried out within 50m of a watercourse, at any one time.

PD27	At Mountphilips Substation site, works within 50m of watercourses, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD28	Along the 110kV UGC on the public road, where works will take place within 50m of a watercourse, additional mitigation measures will be implemented which include silt fencing and placement of sandbag arrangements along preferential surface water flowpaths on the road pavement. Following works on any particular section, any works debris will be removed from the road before the sandbags and silt fences are removed.
PD29	Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included. This will minimise/avoid the requirement for any excavation dewatering as a result of waterlogged soils or surface water runoff. None of these 110kV UGC sections are within the Lower River Shannon SAC.
PD30	Lines of silt fencing and sandbags will be erected along the edge of the road so that surface water runoff from adjacent construction works areas is captured and directed to the excavated trench, where it can be pumped and treated before being released, as per PD24.
PD31	Works to bridge parapet walls at watercourse crossings W7, W36, W53 will be carried out during dry weather, and debris netting will be fixed to the outside of the walls in order to prevent any debris falling into the watercourse below.
PD32	At Mountphilips Substation site, instream construction works at the watercourse crossings W1, W2 and W3 will be followed by site-specific reinstatement measures to ensure the equilibrated restoration of flow character and morphology within the affected reach to achieve baseline character and avoid any deterioration in morphology as required under the Water Framework Directive (WFD). Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margins to stabilise banks, add flood protection and provide riparian buffer; and the use of deflector plates during the restoration of flow. Instream works at W1, W2 and W3 at the Mountphilips Substation site will be undertaken during dry weather within the IFI instream works window (July – September inclusive). As per PD41, instream works at W1, W2 and W3 will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice are followed. Although intended for the purpose of the WFD, this measure will also indirectly contribute to downstream water quality protection in the SAC.
PD33	All new permanent watercourse culverts at the Mountphilips Substation site and any replacement culverts along the public road for the 110kV UGC will be sized to cope with a minimum 100-year flood event.
PD34	Only precast concrete culverts or structures will be used at the watercourse crossing locations at Mountphilips Substation site and for any culvert replacements along the 110kV UGC. Only precast concrete chambers will be used at Joint Bay locations. No batching of wet cement will take place on-site.

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

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

	isolated from the works by over pumping using a flume (pipe), with deflector plates used on the downstream side of the flume to reduce the hydraulic power of the water. Construction works at the crossing will be followed by site-specific reinstatement measures to ensure the equilibrated restoration of flow character and morphology within the affected reach to achieve baseline character and avoid any deterioration in morphology as required under the Water Framework Directive (WFD). Measures will include: bank stabilization measures, reinstatement of bank slope and character; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and the use of deflector plates during the restoration of flow. As per PD41, culvert replacement works will be supervised by a member of CIEEM and the Institute of Fisheries Management to ensure both the Project Design Measures and Best Practice are followed. These measures will ensure that the baseline character is maintained and will ensure that a deterioration in morphology is avoided, as required under the Water Framework Directive. This in turn will protect Aquatic Ecology.
PD51	The sections of the 110kV UGC trench within the R503, in the central part of the 110kV UGC where the adjacent lands comprise predominantly peaty soils, will be lined with a geotextile membrane which will provide support to the cables trench and the road structure.
PD52	Confirmatory surveys for active Otter holts and breeding activity will be carried out 150m upstream and downstream of watercourse crossing locations including those watercourses evaluated as unsuitable for Otter in the current appraisal.
PD53	All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer and outside of 1 hours after sunrise or before sunset during winter.
PD54	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken while breeding females or cubs are present in the holt and NPWS will be notified immediately
PD55	No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand will not take place within 15m of such holts, except under license.
PD56	The prohibited area associated with otter holts, should they be located in confirmatory surveys, will, where appropriate, be protected from any inadvertent disturbance from any works or personnel occurring nearby such as at a bridge and declared as 'Ecology Restriction Zone' with no mention of otters to any onsite staff. Appropriate awareness of the purpose of the excluded area will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each possible access point. All contractors or operators on site will be made fully aware of the procedures pertaining to Ecology Restriction Zones and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
PD57	All excavation works will take place in line with protective measures required to avoid damage to trees during the construction phase of road projects, as stipulated in the NRA document 'Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub prior to, during and post construction of National Road Schemes'. This will include consultation with a qualified arborist, where appropriate to ensure works within the Root Protection Area (RPA) avoid any significant damage to tree roots. Exposed tree roots will be protected where required and excavation methods will be appropriately undertaken so as to avoid damage to RPA's. All excavation works in the RPA will be overseen by the Project Ecologist.

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

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

5.2.3.1 Environmental Management Plan

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

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

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

The EMP will be an important contract document for the main construction contractor (Contractor) who will be contractually obliged to comply with the EMP. An Environmental Clerk of Works will be appointed, who will be independent of the construction Contractor, and it will be the responsibility of the Environmental Clerk of Works to monitor the compliance of the Contractor with the EMP through liaising with the Construction Site Manager and the Project Manager, monitoring construction works on a daily basis and by carrying out regular audits on EMP compliance. The Contractor will be contractually obliged to comply with the requirements of the Environmental Clerk of Works to ensure that the EMP is implemented.

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

5.3 Life Cycle Stages of the UWF Grid Connection

5.3.1 Construction Stage - UWF Grid Connection

5.3.1.1 Overview of the Construction Process

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

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

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

Aggregate and concrete will be delivered directly to works locations.

5.3.1.2 Construction Works Area Boundary

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

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

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

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

Relevant Volume C3 EIAR Figures:

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

5.3.1.3 Duration & Timing

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

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

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

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

5.3.1.3.1 Construction Hours of Work

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

5.3.1.3.2 Scheduling of Works

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

- PD01: UWF Grid Connection construction works during the Hen Harrier breeding season (March to August inclusive) will only take place at the Mountphilips Substation Site; construction of the 110kV UGC between the Mountphilips Substation site and the Consented UWF Substation compound will be carried out during the months of September to February inclusive;
- PD02: If works at Mountphilips Substation site are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory Hen Harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the entire construction works area boundary. These surveys will be completed prior to the start-up of all construction activities. No works will take place within 2 km of any identified active Hen Harrier nest during the hen harrier breeding season;
- PD03: During the Hen Harrier roosting season (October to February inclusive), construction works within 1,000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset;
- PD04: All construction works will be carried out during daylight hours;
- PD06: Construction works will not be carried out within 150m of Rear Cross National School or Lackamore National School, during school hours. In addition, the project Community Liaison Officer will keep each school informed of construction timetables and scheduling;
- PD07: 110kV UGC construction works along the local roads L2264-50 and L6188-0, will not take place at the same time as the UWF Related Works Haul Route Works on these roads. The 110kV UGC construction works will also be scheduled so that the works do not occur on the same days as concrete deliveries for Consented UWF Turbines along these local roads;
- PD11: Construction works for the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm where those works also occur within 350m;
- PD12: As requested by the Roads Department of Tipperary County Council, during pre-planning consultations, the works along the public road network will be scheduled to minimise impacts on schools and local businesses. The works will be scheduled so that they do not disrupt or interfere with Tipperary County Council's road works programme on the R503 through Newport town;
- PD25: Construction works along the 110kV UGC route will cease during heavy or prolonged rainfall events, and any open trenches or excavations will be covered. Use of weathering forecasting will be undertaken in advance of works;
- PD26: A phased approach will be undertaken in relation to excavations, excavation dewatering and any culvert replacement works, where these works occur within 50m of a watercourse. The phased approach will only permit one of main potential sediment producing activities (i.e. excavations, excavation dewatering or new cross structure works), to be carried out within 50m of a watercourse, at any one time;
- PD29: Cable trenching works, joint bay chamber installation and culvert replacement works on the section of 110kV UGC between W13 and W20 (inclusive) and the culvert replacement works at W32 and W34 will only be completed during dry weather in the dryer months of the year – i.e. February to September included;

- PD31: Works to bridge parapet walls at watercourse crossings W7, W36, W53 will be carried out during dry weather;
- PD32: Instream works at W1, W2 and W3 at the Mountphilips Substation site will be undertaken during dry weather within the IFI instream works window (July – September inclusive);
- PD49: In-stream works at Mountphilips Substation site and culvert replacement works at W14 along the R503 Regional Road will only be undertaken during the IFI specified period (July, August and September);
- PD53: All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer and outside of 1 hours after sunrise or before sunset during winter;
- PD54: If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken *while breeding females or cubs are present in the holt* and NPWS will be notified immediately;
- PD58: Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season *i.e.* not during the period of March to August inclusive. This includes hedgerow and scrub removal in addition to hedgerow trimming;
- PD59: Works will not take place at any bridge during the Dipper breeding season (Feb-June inclusive) without a confirmatory survey to determine Dipper presence or absence. If Dippers are present, where possible works will not proceed until breeding has completed;
- PD61: Works will not take place at any bridge during the Kingfisher breeding season (March to July inclusive) without a confirmatory survey to determine the presence of nesting Kingfisher within 150m upstream or downstream of the bridge. If nesting Kingfishers are present, works will not proceed until breeding has completed.
- PD63: All construction works will be carried out during daylight hours. Security lighting will be used at the temporary compound at Mountphilips Substation site. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.
- PD65: While it is not expected that any trees with high suitability for roosting bats will be felled, the following measures will be implemented where a tree with moderate or high bat suitability is to be felled: Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November.
- PD67: No badger setts were recorded within 50m of the UWF Grid Connection during pre-planning surveys. No construction works will be carried within 50m of an active badger sett during the main breeding season (December 1st to June 30th).

5.3.1.3.3 Construction Personnel

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

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

5.3.1.3.4 Welfare Facilities

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

Relevant Volume C3 EIAR Figures:

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

5.3.1.4 Construction Stage Activities

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

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

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

The full text for each OCM is included in Appendix 5-1: Outline Construction Methodologies and Best Practice Measures, and also in Volume D Tab7 and Tab10: UWF Grid Connection Environmental Management Plan (EMP).

In the OCMs, a brief description of the work involved; the duration of this work; personnel, machinery, equipment and tools requirements; construction materials; details of the standard methodology for the construction activities are set out.

The final Method Statements for the construction works will be developed by the appointed Construction Contractors and will be based on the OCMs listed above and included in full in Appendix 5.1.

5.3.1.5 Use of Machinery and Equipment

The main machinery, equipment and tools which will be required during the construction stage are listed in Table 5-4 (the list of machinery, equipment and tools which will be used for each of the main construction activities are set out in the Outline Construction Methodologies in Appendix 5.1).

Table 5-4: Construction machinery, equipment and tools

Construction Machinery	Construction Equipment and Tools
1 No. 90/200 tonne crane	1 No. Cement Mixer
6 No. 12 tonne excavators	6 No. De-Watering pumps
6 No. 6 tonne excavators	6 No. water pumps and associated pipes
6 No. dump trucks	6 No. Diesel generator
6 No. vibrating roller	Hand tools
1 No. 14 tonne roller	Sand bags
6 No. large vans	Silt traps and silt fences
1 No. Tarring vehicle	Oil absorbent booms
2 No. Cable Pulling machines	5 No. siltbuster units/sediment tanks and skips
Jointing Containers	Wooden fence stakes and wooden fencing rails

The Health and Safety Authority (2019) Code of Practice for Avoiding Danger from Overhead Electricity Lines will be implemented as part of standard practices safety practices for construction machinery.

5.3.1.6 Use of Hydrocarbons

Hydrocarbons will be used on-site during construction activities and will be limited to the diesel or petrol fuel and mechanical oils used by the site vehicles and machinery, delivery vehicles and any mobile generators used.

Grease may also be used to line the cable ducts to aid in cable pulling during the construction stage.

5.3.1.7 Other Facilities - Fuel Storage & Tool Storage

All fuels required for construction activities will be stored in a designated location, away from main traffic activity, within the Temporary Compound at the Mountphilips Substation site. All fuel will be stored in bunded, locked storage containers. Overnight parking of plant and machinery will only be permitted at designated sites along the route where there is a hardcore surface in place.

Tools and smaller pieces of equipment will be stored in locked containers, at the Temporary Compound, during the construction stage.

5.3.1.8 Imported Construction Materials

The construction materials, which will be brought onto the UWF Grid Connection site, are listed in Table 5-5 along details of the quantity and source of the materials.

Table 5-5: Quantities, type and source of construction materials

Materials	Quantity	Source of Materials
Concrete	10,870m³ / 1360 No. loads	Roadstone Killough, Co Tipperary Roadstone Bunratty, Co Clare
Aggregate (crushed stone and sand)	16,220m³ / 1350 No. loads	Rear Cross Quarry, Shanballyed-mond, Rear Cross Co Tipperary
Surface dressing (public road sections)	2,250m³ / 210 No. loads	Oranmore, Co. Galway
Lattice towers (End Masts)	4 No. loads	Cork
Electrical cabling and plant	5 No. loads	EU
Switchgear	5 No. loads	EU
Communication cabling and equipment	2 No. loads	EU
Joint bay chamber and cover	10 No. loads	Offaly
Communication chamber and cover	5 No. loads	Offaly
Link Box Chambers and cover	5 No. loads	Offaly
Earth Sheet Link Boxes and connections	5 No. loads	UK
Duct jointing collars and draw ropes	5 No. Loads	Cork
Profiles for ducting and chambers	5 No. Loads	Cork
HDPE Ducting	140 No. loads	Cork
HDPE Comms Ducting	80 No. loads	Cork
110kV electrical cable	29 No. loads	Cork
Fibre Optic communication cables	5 No. loads	Cork
Red cable protection strip	1 No. loads	Cork
Yellow warning tape	1 No. loads	Cork
Steel protection plate	1 No. loads (if required)	Birr, Co Offaly
Marker posts and plates	1 No. load	Dundrum, Co Dublin
General building materials	11 No. loads	Various Irish Suppliers
Control Building doors	1 load	Tullow, Co Carlow
Reinforcing Steel	5 No. loads	Various Irish Suppliers
Geotextile material	2 No. loads	Nenagh
Hedging and tree species	1 No. load	Established nurseries in Ireland
Fencing materials, posts, rails, wire	1 No. load	Arrabawn Co-Op, Reiska

5.3.1.8.1 Delivery Vehicles – Axles

Delivery machinery will comprise of standard 4-axel rigid tipper units for aggregate and concrete deliveries and tractor units with 2-4 axel articulated flat-beds or tautliner for other material deliveries. Smaller parts may be delivered using vans and car trailers.

5.3.1.8.2 Material and Delivery Traffic Haulage Route

The delivery of construction materials will be managed in the following manner:

Aggregate, Concrete and Road Surface Dressing

Aggregate, concrete and public road surface dressing will be delivered directly to construction works areas. The HGVs delivering this material will travel to the works areas along both the regional and local road networks, using the haul routes specified in Figure GC 5. 22 - Haul Routes for Aggregate and Concrete Deliveries

Other Construction Material

Other materials, such as ducting, geotextile and other construction materials, will be sourced from various suppliers and will be transported to the Temporary Compound, at Mountphilips Substation site, via the national and regional road network. These materials will be stored at the Temporary Compound until required at works areas. Each day a smaller truck will be used to deliver the daily volume of ducting, cable protection strip, warning tape, duct jointing collars etc. to each active works area.

Relevant Volume C3 EIAR Figures

Figure GC 5.8 - Plan View of the Temporary Construction Compound at Mountphilips Substation
Figure GC 5.22- Haul Routes for Aggregate and Concrete Deliveries

5.3.1.9 Traffic Management

5.3.1.9.1 Public Road Use

The following public roads will be used by the development of the UWF Grid Connection works and associated haulage;

- **Regional Road R503** and
- **Local Roads** (designated as "L" Roads); L2166-10, L6013-0, L2156-0, L2157-0, L6009-0, L5337-1, L2264-50, L6188-0.

With the exception of the L5337-1 at Tullow Newport, all of these roads will be subject to trenching and joint bay excavation works for the 110kV UGC.

The L6013-0 will not be used as a haulage route from the Mountphilips Substation Site (location of the temporary construction compound) to the L2156-0, L2157-0 and L6009-0 during installation of the 110kV UGC along these roads. Rather traffic from the temporary construction compound at Mountphilips Substation site will use the L2166-10, through Newport town and then the L5337-1 at Tullow to access the L2156-0, L2157-0 and L6009-0 works, thus avoiding the L6013-0 entirely.

5.3.1.9.2 Road / Lane Closures along the Public Road Network

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

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

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

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

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

5.3.1.9.3 Road Licences

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

5.3.1.9.4 Maintaining Access to Properties

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

5.3.1.9.5 Engagement with Local Residents

Contact will be maintained with local residents on the day to day timing of the works. A Community Liaison Officer (CLO) will be appointed as the point of contact between the Promoter, the local community and the wider public. The CLO will keep very active contact with local residents on the traffic arrangements around the works day to day.

5.3.1.9.6 Flagmen at Road Works

Flagmen will be employed at road work locations to control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.

5.3.1.9.7 Signage for Road Works

Informational signage will be erected to provide an overview of the construction traffic timetable; the Environmental Clerk of Works contact number, the Community Liaison Officer and will serve as an advance warning to expect HGVs on the road. These signs will be provided at the Mountphilips Substation site entrance;

Rear Cross village, at Derryleigh on the local road near the junction with the R503, and at Knockmaroe on the local road near the junction with the R503.

Directional signage will be installed at specific locations along the haul routes. The haul routes for construction materials deliveries to the Mountphilips Substation site will have clear directional signs from Newport to the site. The haul routes for construction material deliveries to the works along the 110kV UGC will have clear directional signs and this signage will be relocated to indicate the location of the works as the works progress along the 110kV UGC route.

Advance warning signage will be erected on both approaches to road works locations. The placement of this signage has been designed based on the recorded 85th percentile traffic speeds, or the posted limit, whichever is the higher.

Relevant Volume C3 EIAR Figures:

Figure GC 5.23: Advance Warning Signage for Road Works on 50km/hr Roads.
Figure GC 5.24: Advance Warning Signage for Road Works on 80km/hr Roads

5.3.1.9.8 Traffic Management Plan

A Traffic Management Plan for UWF Grid Connection has been developed and will be a key construction contract document. The objective of the Traffic Management Plan is to control and minimise the traffic impacts of construction insofar as it may affect the road network, local residents and the travelling public on the public roads close to and adjacent to the construction site, through measures to maximise road safety while keeping traffic flowing as freely as possible.

The Traffic Management Plan details the traffic management measures to be undertaken on the public roads;

- at and on approach to road works locations;
- at and on approach to the site entrance at Coole for the Mountphilips Substation and the temporary compound;
- along the R503 and along local roads on the routes of concentrated construction traffic.

The **Traffic Management Plan** is appended to this EIA Report as part of Volume D: UWF Grid Connection Environmental Management Plan.

5.3.2 Operational Stage - UWF Grid Connection

5.3.2.1 Overview of the Operational stage of UWF Grid Connection

Following commissioning, the UWF Grid Connection will be taken in charge by ESB Networks and both the Mountphilips Substation and the Mountphilips – Upperchurch 110kV UGC will become part of the national electricity network. The new asset will be managed and operated by ESB Networks.

5.3.2.2 Duration and Timing of Operational Stage

Table 5-6: Duration and Timing of the Operation Phase of UWF Grid Connection

Description	Duration
Operation of the UWF Grid Connection	The UWF Grid Connection will be operated on a **permanent** basis by ESB Networks.
Mountphilips Substation: Routine Monthly Inspections (c.2hrs) Annual Maintenance Daily Remote Monitoring	c. 2hrs for monthly inspections c.2 days for annual maintenance - equates to a total of c.5 days per year associated with on-site inspections and maintenance.
110kV UGC: Annual Inspection and testing at Joint Bay link boxes Visual inspection of the lands over the 110kV UGC	Up to 8 days per year associated with inspections and testing carried out by a 2 man crew.
110kV UGC: Planned Maintenance of the 110kV UGC - Infrequent, if at all, during the lifetime of the Grid Connection, and expected to involve reopening of joint bay chambers to pull cables, with reinstatement of the road/built surface following works.	c.8 – 10 days per cable pulling activity: 2 days for cable pulling, 1 week for cable jointing 1 day for testing
110kV UGC: Unplanned Repair of the 110kV UGC – it is not expected that there will be any requirements for unplanned repairs to the 110kV UGC. However, in the unlikely event that repairs are required, they will be of a similar duration as the Planned Maintenance, above.	Same as for planned maintenance above

The duration of activities during the operational stage provided above are approximate and may be shorter or longer, depending on the work involved, number of crews/personnel, weather conditions etc.

5.3.2.3 Operational Personnel

It is expected that scheduled inspection and maintenance activities will be carried out by ESB Networks personnel (2 men crews) over a total of 13 days per year.

Very infrequent planned maintenance or unplanned repairs may be required, if at all, during the lifetime of the UWF Grid Connection, it is expected that one crew with c.6 ESB Networks personnel would be required for 1 week – 2 weeks duration, depending on the nature of the repairs work.

5.3.2.4 Operational Activities

5.3.2.4.1 Mountphilips Substation

Daily monitoring: The Mountphilips Substation will not be permanently manned, as the equipment will be operated by remote computer link which will be connected to the National Control Centre.

Monthly Inspection: will mainly involve the testing of the electrical equipment and apparatus and testing of the electrical, communications and control systems along with visual inspections of the Mountphilips Sub-station Compound and Control Building. The security and condition of the surrounding palisade fence and entrance gates, and the condition of the access road, drainage network and watercourse crossing structures will also be inspected during these monthly visits.

Monitoring of the communication cables will be carried out remotely.

Annual Maintenance: will involve testing of equipment, apparatus and systems, and may also involve the replacement of electrical parts within the Substation Compound or Control Building. All parts and tools will be brought into the Mountphilips Substation as required. Mobile generators and hoists may also be required for some maintenance activities.

5.3.2.4.2 Mountphilips - Upperchurch 110kV UGC

Annual Inspection: The electric cables will be inspected annually by ESB Networks. The annual inspection which will include checks, inspections and testing via the link boxes which will have been installed in a link box chamber at Joint Bays. The man-hole type cover over the link box chamber, which is at road surface level, will be removed to provide access to the link box within. Checks and testing of the electric cables will be carried out using hand held tools. The entire length of the 110kV UGC will also be visually inspected, by drive over of the route. Traffic management will be set up as required during inspections.

Planned Maintenance: The minimum lifecycle of the electrical cables and electric plant is 80 - 100 years in accordance with ESB Networks Specifications. As the cables will be factory tested to a high standard, sourced from ESBN approved suppliers and buried in a concrete enclosed trench in accordance with ESBN specifications, it is not expected that the cables will require replacement during their operational life. However, if any particular cable is found not to be performing to its specification, it will be scheduled for replacement.

Replacement of cables will involve the use of an excavator to remove the road surface and concrete covers from the top of the joint bay chambers at each end of the cable to be replaced. The sand inside the chambers is then removed and the cable joints opened. The cable can then be pulled out of its duct using a cable winch set up at one of the joint bays, and a new cable is then be pulled into the duct and jointed at both ends. The sand will then be backfilled into the chambers and the covers replaced and the road reinstated. Testing and commissioning in a similar manner to the construction phase will then be carried out. Traffic management will be set up as required.

Unplanned Repairs: It is not likely or expected that there will be any requirements for unplanned repairs to UWF Grid Connection during its operation. However, in the unlikely event that repairs are required, the associated activities and likely to be similar to the planned maintenance activities described above.

5.3.2.5 Use of Machinery and Equipment

The main machinery, equipment and tools which will be used during the operation of the UWF Grid Connection are listed in Table 5-7.

Table 5-7: Use of Machinery and Equipment during the Operation of the Grid Connection

Machinery	Equipment	Materials
Mountphilips Substation		
Van – equipped with any necessary hand tools and testing equipment	Hand tools	Replacement electrical or communication parts
Mobile Generator, and associated fuel	Testing equipment	Small volumes of sulphur hexafluoride (SF6) compressed gas
Mobile lifts – e.g. hoists, cherry pickers etc.	Equipment or apparatus for Mountphilips Substation for testing or maintenance	Small volumes of grease/oils
Mountphilips – Upperchurch 110kV UGC		
Vans equipped with an necessary hand tools and testing equipment	Jointing Containers for very infrequent Planned Maintenance or Unplanned Repairs	Replacement 110kV or communication cables and ancillary equipment
Excavator for any very infrequent Planned Maintenance or Unplanned Repairs	Testing equipment	Road surfacing material
Cable pulling winch and spool trailer and tractor for any very infrequent Planned Maintenance or Unplanned Repairs		

5.3.2.6 Use of Hydrocarbons

A small volume of hydrocarbons will be used on the UWF Grid Connection site during operational activities and is limited to the diesel or petrol fuel used by the site vehicles and machinery and any mobile generators used. Small volumes of oil and grease will be used during maintenance of electrical equipment the Mountphilips Substation.

5.3.2.7 Welfare Facilities

There will be no requirement for office facilities at the operational Mountphilips Substation. Self-contained toilet facilities, serviced by a rain water harvesting system will be installed at the Control Building.

Relevant Volume C3 EIAR Figures

Figure GC 5.6 – Plan and Elevation of the Control Building at Mountphilips Substation

5.3.2.8 Other Facilities - Fuel Storage & Tool Storage

Fuel Storage: There will be no requirement for fuel storage facilities during operations.

Tool Storage: There will be no requirement for tool storage facilities, all tools will be brought onto site as required.

5.3.3 Changes to UWF Grid Connection

Decommissioning: The UWF Grid Connection will remain permanently in place as part of the national electricity network and thus decommissioning is not envisaged.

5.4 Use of Natural Resources, Emissions & Wastes

5.4.1 Use of Natural Resources

5.4.1.1 Use of Resources: Land

5.4.1.1.1 Requirements for Land

Construction Land Requirement: Construction works areas on lands comprises 4.8ha of agricultural lands. Two of the landholdings are at the Mountphilips Substation site. The 3rd landholding relates to a grassland field at the eastern extremity of the 110kV UGC route where the already Consented UWF Substation will be located- construction works in this field will only be in the future compound area. The remaining construction works areas relate to public road/built environment which are not classified as a natural resource.

Operational Land Requirement: Once the Development is constructed, the requirement for lands will reduce considerably to 1.75ha, comprising the footprint of new permanent infrastructure within the Mountphilips Substation site only. The surrounding agricultural lands will be reseeded with grass and returned to agricultural grassland use.

Restoring Connectivity of Lands: Landholding access, at the Mountphilips Substation site, to lands on either side of the new access road, will be maintained in each of the four fields by the erection of gates along the boundary of the new access road, which will allow livestock and farm machinery to cross over the new access road.

Relevant Volume C3 EIAR Figures:

Figure GC 5.25 - Land Use

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_11: Reinstatement of Land at Mountphilips Substation site

5.4.1.2 Use of Resources: Biodiversity

5.4.1.2.1 Hedgerows, Trees and Earthen Banks

Hedgerows, trees and earthen banks occur at field boundaries at the Mountphilips Substation site. The removal of hedgerows and trees is limited to the construction stage and will be carried out outside of the bird breeding season.

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

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

All new hedging will be locally sourced native fruiting hedgerow species, and the replacement trees will be semi-mature native hedgerow species. A mix of local provenance native fruiting hedge species such as hawthorn, blackthorn, holly, hazel, guelder rose, spindle, crab apple, bird cherry, elder and buckthorn, will be used for new hedgerows at Mountphilips Substation site.

Following the completion of construction works the berms around the substation compound and the side of the berms along the new access road will be reseeded with grasses and wildflower species common to the surrounding vegetation. Local provenance native wildflower seed of flowering plants like clovers, vetches and knapweed will be included.

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_11: Reinstatement of Land at Mountphilips Substation site

5.4.1.2.2 Forestry

No felling of forestry is required for UWF Grid Connection.

5.4.1.2.3 Invasive Species

No invasive species were identified at the Mountphilips Substation site.

Preventing the disturbance of existing infestations of invasive plant species: 38 infestation sites have been identified on the 110kV UGC route on the public road. Construction works for the 110kV UGC will be strictly be carried out in the road pavements/built surfaces with no interference with the road verges, thus minimising the risk of spread of these species. Pre-construction confirmatory surveys will be carried out to identify and map the location/extent of infestations on the 110kV UGC route. To prevent the spread of invasive plant species: Infestations of knotweed will be covered with polyethylene grass carpet terram covering under the direct supervision of an invasive species specialist. All excavations from the 110kV UGC trench within 15m of an identified infestations will be disposed as potentially contaminated material, by a licenced contractor to a suitably licenced waste facility.

Preventing the importation of invasive plant species: To prevent the importation of invasive plant species, prior to arrival on site, all plant, vehicles and equipment which are involved in construction works will be thoroughly cleaned, all vegetative materials removed, steam cleaned at high-pressure with water hotter than 65 degrees Celsius and then let dry, before entering the site. Dedicated construction personnel will be trained in the inspection, and cleaning of delivery vehicles and the correct disposal of any adherent material,

To prevent the inadvertent importation of invasive animal species, plants and associated packaging will be checked for the presence/evidence of invasive animals such as the white toothed shrew at source and once against on arrival to the UWF Grid Connection works areas.

Preventing the spread of disease at watercourses: To prevent the spread of crayfish plague, residual water in any containers/vessels used in works near watercourses will be flushed with disinfectant (Virkon Aquatic) onto grass. All footwear used, or to be used, in watercourses will be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards.

An Invasive Species Management Plan will be implemented to prevent the spread of invasive species, this Plan is included in Volume D: UWF Grid Connection Environmental Management Plan.

5.4.1.3 Use of Resources: Water

5.4.1.3.1 Potable Water

During construction, there will be no requirement for an on-site well or mains water connection at the Mountphilips Substation site. Bottled drinking water will be stored in the canteen at the Temporary Compound, and will be carried in small volumes by each crew or other personnel working at locations away from the Mountphilips Substation site.

During operation, the demand for potable water will be very low, and, as the substation will only be occupied occasionally, bottled drinking water will be brought into the Mountphilips Substation, as needed.

5.4.1.3.2 Non-potable water

During construction, non-potable water for hand washing or toilet flushing will be imported to the Temporary Compound from a local municipal supply and stored in water holding tanks at the toilet block at the Temporary Compound. Non-potable water will also be stored in small water holding tanks in the single portable toilets, which will be located at works areas, along 110kV UGC route.

During operation, non-potable water for hand washing or toilet flushing will be supplied from a rainwater harvesting system which will be integrated into the Control Building at Mountphilips Substation during its construction (this mitigation measure is part of the design of the UWF Grid Connection and will avoid impacts to groundwater). The rainwater harvesting system will provide all of the water requirements for welfare facilities at the Mountphilips Substation during its operation, in line with sustainable water supply and for the protection of local groundwater features only. There are no requirements for such a measure arising as a requirement to avoid/reduce the likelihood of significant effects on European Sites, due to separation distance via hydrological pathways.

5.4.1.3.3 Drilling Activities

During the construction stage, some water will be required to cool the cutting head and aid in the removal of cut material from the bore hole during the drilling activities at the two watercourse crossings (W8 and W9) on the L6009-0 road at Castlewaller/Carrowkeale. This water will be sourced from a local municipal supply as required. Water used in the bore hole will be collected and removed for treatment in a licenced water treatment plant.

5.4.1.4 Use of Resources: Soils

5.4.1.4.1 Construction stage: Soils at Mountphilips Substation site

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

5.4.1.4.2 Construction stage: Storage of Soils at Mountphilips Substation site

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

Relevant Volume C4 EIAR Appendices

Appendix 5.1: Outline Construction Methodologies and Best Practice Measures

GC_OCM_11: Reinstatement of Land at Mountphilips Substation site

5.4.1.4.3 Construction stage: Spoiled soils along the 110kV UGC

Bitumen bound surface dress, base layer aggregates, subsoil and rock will be excavated from the 110kV UGC trenches and joint bay locations.

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

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

The management of spoil will be carried out in accordance with the Waste Management Plan which forms part of the UWF Grid Connection Environmental Management Plan (see Volume D).

5.4.1.4.4 Construction stage: Imported Rock

Up to 16,220m^3 of graded crushed stone will be imported onto the UWF Grid Connection work areas from the local Rear Cross Quarry in Shanballyedmond.

5.4.1.4.5 Operational Stage - Soil

No excavations of soils will be required during the routine operation of the UWF Grid Connection.

Planned maintenance or unplanned repairs, if any occur, on the 110kV UGC, is likely to involve the re-opening of the underground chambers, at Joint Bays. This work which will result in very small volumes of surface dressing, crushed stone and sand being temporarily removed from the area directly over the joint bay covers, along with sand removed from within the chamber, stored adjacent to the Joint Bay, and re-used to reinstate the chamber and top of the Joint Bay following the completion of the repairs. The finished layer, if along the public road, will be surface dressed. No soils are expected to be required during the operational stage.

5.4.2 Emissions

The main potential for emissions arises during the Construction Stage.

5.4.2.1 Dust

Dust may arise during the construction stage, due to the transportation of aggregate, movement of delivery vehicles; the movement of excavated material, and from stored excavated materials, particularly during dry and windy weather.

During operation, the presence of excavations on-site, and therefore dust emissions, will be negligible – excavations, will generally only occur at Joint Bays during planned maintenance/unplanned repairs, which are expected to occur only very infrequently (if at all) during operation, and will involve the excavation of surface dressing, crushed stone and sand rather than soils.

5.4.2.2 Vehicle Exhausts

During the construction stage, all of the machinery used will be run on hydrocarbons and will emit nitrogen dioxide and other greenhouse gas emissions.

During the operational stage, the presence of vehicles on site, and therefore nitrogen dioxide and other greenhouse gas emissions, will be negligible with a van or four wheel drive vehicle being used c.13 days per year, split roughly half and half between the Mountphilips Substation and the 110kV UGC. Vehicles emissions from any planned maintenance or unplanned repairs along the 110kV UGC will be negligible due to the small number of vehicles used over a very short duration, and the infrequency of these works, if they occur at all.

5.4.2.3 Noise

During the construction stage, heavy machinery and vehicles which will be used at works areas will emit noise during their operation, noise will also be emitted from certain construction activities such as excavations or by mobile generators which may be used at work areas.

During the operational stage, the presence of vehicles on site, and therefore noise emissions, will be negligible with a van or four wheel drive vehicle being used c.13 days per year, split roughly half and half between the Mountphilips Substation and the 110kV UGC. Mountphilips Substation will emit noise however this is not likely to be audible above the existing background noise levels at nearest residence, which is 385m distant. Noise emissions from any planned maintenance or unplanned repairs along the 110kV UGC will be negligible due to the small number of vehicles used over a very short duration, and the infrequency of these works, if they occur at all.

5.4.2.4 Vibration

Construction works, including excavations and the use of heavy machinery will cause negligible levels of ground vibration in the immediate vicinity of groundworks. **No blasting or piling** will occur at the UWF Grid Connection construction works areas.

No vibration emissions are expected during the operation of the UWF Grid Connection.

5.4.2.5 Light

Lighting will be used at the Temporary Compound at the Mountphilips Substation site during construction.

Lighting will be used at the Mountphilips Substation Compound during its operation to illuminate the Sub-station Compound, the Control Building and access points.

This lighting will use a cowled design along with motion-sensor and timer controlled lights which will not remain turned-on overnight. Outside the Mountphilips Substation site, the 110kV UGC does not require any lighting.

5.4.2.6 Electromagnetic Radiation

Electric and magnetic fields are present anywhere electricity is generated, distributed or used and therefore these electromagnetic fields (EMF) are a common occurrence in everyday life. The operational Mountphilips Substation and the underground 110kV cables will each be a source of very low frequency (50Hz) electro-magnetic fields. No electromagnetic fields will occur during the construction stage.

5.4.3 Waste

The greatest potential for waste occurs during the construction stage of the project.

5.4.3.1 Waste Water

During the construction stage, self-contained toilets, with integrated waste water storage tanks, will be provided for construction workers, at the Temporary Compound at the Mountphilips Substation site. Single self-contained, portable solar-powered toilets will also be provided at each active works area along the 110kV UGC. The waste water storage tanks associated with the above toilet facilities will be emptied on a regular basis, by a licence waste contractor, such as Enva, or other appropriate licenced operator for disposal at Enva's licenced waste water treatment plant in Co. Cork.

During the operational stage, toilet facilities will be installed in the Mountphilips Substation Control Building. The waste water storage tanks associated with the toilet facility at Mountphilips will be emptied on a regular basis to a licensed waste facility.

5.4.3.2 General Waste

During the construction stage, materials such as pallets, packaging, and excess construction and building materials will be generated in small quantities at construction works areas. All individual waste streams will be identified at source, separated into recyclable and landfill waste and stored in a designated area at the Temporary Compound. This waste will be removed regularly, by a licence waste contractor, such as Kieran Kelly Haulage in Co. Clare, or other appropriate licenced operator for disposal at a licenced waste facility.

During operation, general waste will arise in small quantities during maintenance activities at the operational Mountphilips Substation, including empty containers, packaging, materials and rags etc. This waste will be stored in a suitable container in a designated area with the secure Substation Compound.

5.4.3.3 Chemical waste

During construction, very small quantities of chemical waste will be generated, this waste is limited to solid waste oil, such as oily rags. All chemical wastes will be stored in secure, bunded and covered storage containers, in a designated secure part of the Temporary Compound at the Mountphilips Substation site. This waste will be removed regularly, by a licence waste contractor, such as Enva, or other appropriate licenced operator for disposal at Enva's licenced waste water treatment plant in Co.Clare.

During operation, small volumes of chemical wastes, including oil and grease, may arise during the operational stage. These wastes will be taken off-site by the maintenance personnel and disposed of in an appropriately licensed facility.

5.4.3.4 Arisings / Spoiled Soils

During the construction stage, bitumen bound surface dressing and base layer aggregates will be excavated from the 110kV UGC trenches and joint bay locations. In addition subsoil and rock will be excavated. All of this material will be removed to appropriately licensed waste facilities, as follows:

- Of the c.2,740 m^3 of bitumen bound surface dressing, c.2650m^3 will be removed to a licensed waste facility such as Kellys of Fantan, or other appropriately licensed facility (such as Kieran Kelly Haulage, for example). The remaining c.90m^3 relates to *potentially* contaminated material, where this material is excavated within 15m of invasive species infestations (*see point 3 below*).

- Of the c.1,830 m^3 of base layer aggregate, c.16,450m^3 of subsoil, and c.2360m^3 of rock, of these totals c.1770m^3, c.15900m^3 and c.2300m^3 respectively will be disposed of as spoil and will be removed to a licensed waste facility such as Kellys of Fantan, or other appropriately licensed facility (such as Kieran Kelly Haulage or Fogarty Concrete for example). The remaining c.60m^3, c.550m^3 and c.60m^3 respectively relates to *potentially* contaminated material, where this material is excavated within 15m of invasive species infestations (*see point 3 below*).

- 760m^3 of excavated material, will comprise c.90m^3 of bitumen bound surface dressing, c.60m^3 of base layer aggregate, c.550m^3 of subsoil and c.60m^3 of rock, being the material excavated within 15m of invasive species infestations along the route of the 110kV UGC. This material will be classified as potentially contaminated and will be removed to Enva, Co. Laois or other appropriately licensed facility. The locations of these infestations were found during surveys and are identified on mapping within the Invasive Species Management Plan, part of the UWF Grid Connection Environmental Management Plan (Volume D).

Small volumes of stone and aggregate/subsoils will also be excavated at any culvert replacement locations along the 110kV UGC route (up to 13. No. in total).

The management of spoil will be carried out in accordance with the Waste Management Plan which forms part of the UWF Grid Connection Environmental Management Plan (see Volume D).

During the operational stage, no arisings are likely to occur during the operation of the Mountphilips Substation site or during annual inspection and maintenance of the 110kV UGC. Very small volumes of bitumen bound surface dressing would occur as a result of opening of joint bay chambers during any planned maintenance or unplanned repairs at Joint Bay locations along the 110kV UGC. This waste will be removed to an appropriately licensed waste facility.

5.4.3.5 Waste Management Plan

Any wastes which result from the construction of the UWF Grid Connection will be managed under the Waste Management Plan. The Plan includes a hierarchy of controls in relation to waste; Prevent, Reduce, Reuse, Recover and Responsibility and the controls and procedures which will be undertaken as part of the management of waste are specified. A strict chain of custody system will be set up as part of the Waste Management Plan to enable all wastes to be controlled in the appropriate manner.

The construction stage **Waste Management Plan** is included in Volume D: UWF Grid Connection Environmental Management Plan**.**

During the operation of UWF Grid Connection, wastes will be managed by ESB Networks under their waste management system.

5.5 Vulnerability of the Project to Major Accidents and Natural Disasters

Major accidents or natural disasters which have the potential to affect the UWF Grid Connection are described hereunder. The vulnerability (exposure and resilience) of the UWF Grid Connection to major accidents and disasters and the risk of these accidents or disasters is classified according to the *Guide to Risk Assessment in Major Emergency Management* (DoEHLG, 2010), see Appendix 5.7: A Guide to Risk Assessment in Major Emergency Management Jan 2010.

5.5.1 Vulnerability to Major Accidents

It is apparent from the EIA Directive that 'major accident' mainly applies to notified Seveso establishments which operate under the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015, where Dangerous Substances are identified in Schedule 1.

The UWF Grid Connection **is not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during the construction and operation of the UWF Grid Connection, and very small volumes of grease and sulphur hexafluoride (SF6) gas used at the Mountphilips Substation during its operation. Furthermore there are no Seveso sites in proximity to the UWF Grid Connection site, the closest being Grassland Agro in Limerick.

5.5.2 Vulnerability to Natural Disasters

Natural disasters which could *potentially* affect the UWF Grid Connection include flooding and land slippage. The likelihood of these natural disasters occurring is discussed below, with likelihood of the natural disaster occurring rated according to the DoEHLG 2010 Guidelines. The UWF Grid Connection is not considered to be vulnerable to either high winds or extremes of weather as a result of climate change.

5.5.2.1 Flooding

A flood risk assessment study was conducted by David Broderick of Hydro Environmental Services to identify potential flood risks associated with the proposed UWF Grid Connection (see Appendix 11.3: Flood Risk Assessment). It was concluded that there will be no increased local flood risk as a result of the proposed development, mainly due to the underground nature of the 110kV UGC and the minimal footprint of the over ground permanent infrastructure at Mountphilips Substation which is also located outside of mapped flooding areas with a Low Risk of flooding.

In May 2018, the Minister of State for the Office of Public Works & Flood Relief, published the Flood Risk Management Plans. The Minister also launched a new website, www.floodinfo.ie. This map and plan viewer website is another important resource, to support planning and emergency response planning to plan and respond to flood risk. Interaction with mapped fluvial (river) or pluvial (rainfall) flooding zones as per the www.floodinfo.ie website, shows that with the exception of a tributary stream of the Newport River near Coole Crossroads which has mapped fluvial flooding, the UWF Grid Connection is not located within any mapped fluvial or pluvial flooding zone. It is therefore considered that the location of the UWF Grid Connection is at low risk to flooding.

Due to the distributed nature of the works over a large geographical area, the minimal footprint of the over ground permanent infrastructure at Mountphilips Substation site, the location of Mountphilips Substation side outside of mapped flooding areas, the fact that all permanent hardstanding will have runoff control measures and that all new permanent culverts will be sized for peak flood flows (Project Design Measure),

the magnitude of impact is considered to be Negligible, and the likelihood of a flooding disaster occurring is **Extremely Unlikely**.

5.5.2.2 Land-slippage

Given the stable nature of soils at Mountphilips Substation, being poorly draining mineral soil over sandstone tills with no peat present, it is considered that there is a very low risk of land slippage at the Mountphilips Substation site, and the likelihood of a land slippage event is **Extremely Unlikely**.

The entirety of the route of the 110kV UGC, outside the Mountphilips Substation site, is located within road pavements/built surfaces, which are generally underlain by sandstone tills. Peat is mapped under some short sections of the public road in the central area of the 110kV UGC route, however given the location of the 110kV UGC route under the carriageway of a regional public road and the use of geotextile material to support the trench in this central area of the 110kV UGC, it is considered that there is a very low risk of land slippage, and the likelihood of a land slippage event is **Extremely Unlikely**.

5.5.2.3 Vulnerability to Climate Change

High rainfall events and subsequent flooding are now considered to be a consequence of climate change. Flooding is discussed in the previous section and an unrelated flooding disaster is considered Unlikely at this site, and the project is not considered to be vulnerable to flooding events.

Extreme weather such as that experienced in Ireland in recent years, both high temperatures and high winds, will not affect the 110kV UGC which will be underground. The new Mountphilips Substation will not be vulnerable to these extremes because the electrical plant is designed to withstand temperature variability and exposure in the open countryside. Therefore the likelihood of UWF Grid Connection being affect by Climate related weather extremes is considered to be **Extremely Unlikely**.

5.5.2.4 Consequences of Natural Disasters Occurring

The consequence of the impact if the event occurs is described here.

Due to the low number of personnel working on-site at any one location, the consequence of a flooding or land slippage disaster, if they did occur, is considered to be **Limited**.

Due to the relatively low number of people living or working locally, the consequence of a flooding or land slippage disaster, if they did occur, is considered to be **Limited.**

The consequences to water quality due to land slippage or flooding could be **Serious** due to the widespread effects and extended duration of sedimentation effects in downstream watercourses.

5.5.2.5 Overall Risk

When the likelihood and the consequence of a potential flooding or land slippage disaster occurring is applied to the risk matrix from the DoEHLG 2010 guidelines, a broad indication of the critical nature of each risk can be determined.

In relation to on-site personnel and other people in the locality, a flooding or land slippage event would be classed a 'normal emergency' - based on a likelihood rating of Extremely Unlikely and a consequence rating of **Limited**.

According to the DoEHLG 2010 guidelines, in relation to downstream water quality, due to the higher level of effect (Serious) on water quality a flooding or land slippage event could be at the **lower extreme of 'major emergency'**.

5.5.2.6 Mitigation Measures

In relation to flooding risk, the mitigation measures, listed below, will be implemented which relate to scheduling works when flows are likely to be lower and ground conditions are typically dryer, this will reduce any risk of flooding and any vulnerability to unrelated flood events:

- Project Design Measure PD48: The new permanent cross structures at the Mountphilips Substation site and the replacement culvert at W14 along the R503 will be bottomless or clear spanning.
- Project Design Measure PD25: Construction works along the 110kV UGC route will cease during heavy or prolonged rainfall events, and any open trenches or excavations will be covered. Use of weathering forecasting will be undertaken in advance of works;

In relation to land-slippage risk, the sections of the 110kV UGC trench within the R503, in the central part of the 110kV UGC where the adjacent lands comprise predominantly peaty soils, will be lined with a geotextile membrane which will provide support to the cables and additional support and stability to the structure of the road. This will further reduce any risk of land slippage.

In relation to unrelated disasters in the locality: Should a disaster occur, unrelated to the project but in the locality – the use of weather forecasting, and the daily monitoring of the works by the Environmental Clerk of Works and site Ecologist, in addition to the measures detailed herein, will ensure that the project will not make the consequences of the event worse. In addition, it is considered that the development of UWF Grid Connection will not increase the likelihood of such an event occurring.

5.6 Description of Other Projects included in Cumulative Evaluations

A cumulative evaluation of the effects of the subject development together with other projects is presented in all of the Environmental Factor topic chapters.

Projects included in the cumulative evaluations in this EIA Report comprise related (off-site) projects related to the UWF Grid Connection (i.e. other elements of the Whole UWF Project), and also other unrelated projects which are not connected with the UWF Grid Connection. These projects are described in this Section 5.6. Descriptions of relevant activities in the surrounding area are also included.

5.6.1 Description of Related Projects - the Other Elements of the Whole UWF Project

UWF Grid Connection is part of a whole project – the Whole Upperchurch Windfarm Project (Whole UWF Project). The characteristics of the UWF Grid Connection are described in Sections 5.1 to 5.5 of this Chapter 5. To facilitate the evaluation of cumulative impact of the other parts of the Whole UWF Project with UWF Grid Connection, an overview description is provided, in this Section 5.6.1, of all the Other Elements of the Whole UWF Project.

Table 5-8: Element 1 to 5 of the Whole UWF Project

	Element of the whole UWF project	Composition of each Element	Location for description of each element
1	**The Subject Development** UWF Grid Connection	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Ancillary Works at Mountphilips Substation site	Sections 5.1 to Section 5.5 herein
2	UWF Related Works	Internal Windfarm Cabling Realigned Windfarm Roads Haul Route Works Telecom Relay Pole RW Ancillary Works	Appendix 5.3
3	UWF Replacement Forestry	Replacement Forestry at Foilnaman	Appendix 5.4
4	Upperchurch Windfarm	Consented UWF Turbines Consented UWF Substation Consented UWF Roads UWF Ancillary Works	Appendix 5.5
5	UWF Other Activities	Haul Route Activities Upperchurch Hen Harrier Scheme Monitoring Activities Overhead Line Activities	Appendix 5.6

An **Overview description of each elements 2, 3, 4, and 5** of each other element in this Section hereunder. **A more detailed description of each element 2, 3, 4, and 5** (presented in a format similar to this chapter and with smaller scale reference mapping and figures) is presented in Appendices 5.3 to Appendix 5.6 in Volume C4: EIAR Appendices**.**

An EIA has been carried out for Upperchurch Windfarm, and EIS accompanied the 2013 planning application. EIA Reports have also been prepared to accompany planning applications to the relevant Competent Authorities, for UWF Replacement Forestry and UWF Related Works (Note: the EIA Report for UWF Related Works was revised at appeal stage to an Bord Pleanála).. The **full EIA and EIS, EIA Report and Revised EIA Report** (as appropriate) for **Elements 2, 4, and 3 (respectively)** are included in Volume F: Reference Documents for Other Elements of the Whole UWF Project.

Relevant Volume C3 EIAR Figures:

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

5.6.1.1 Cumulative Locational Context of all the Elements

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

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

- It overlaps with Upperchurch Windfarm at the Consented UWF Substation.
- It is adjacent to the UWF Related Works and the Upperchurch Windfarm in Knocknabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands
- At Mountphilips Substation**,** some fiber-wrapping and re-sagging activities (UWF Other Activities) will be carried out from the new End Mast

Relevant Volume C3 EIAR Figures:

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

Figure CE 1.3: UWF Grid Connection and the Other Elements of the Whole UWF Project in Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands (close-up aerial mapping).

5.6.1.2 Overview Description of Element 2: UWF Related Works

5.6.1.2.1 Introduction to UWF Related Works Reports

A planning application was made by Ecopower Developments Limited to Tipperary County Council for works relating to the construction and operation of the already consented Upperchurch Windfarm – to be called UWF Related Works (Planning Ref. 18/600913). The planning application was accompanied by an EIA Report. The planning application was submitted on 17/07/2018, Further Information was requested on 10/09/2018. Tipperary County Council Refused Permission on 10th January, 2019. On 6th February, 2019, Ecopower Developments lodged a 1st Party Appeal with An Bord Pleanála on the UWF Related Works Refusal by Tipperary County Council. ABP Ref. 303634-19.

The UWF Related Works project was not changed in terms of location and characteristics for the Appeal to An Bord Pleanála. However the original May 2018 EIA Report was revised for the appeal to An Bord Pleanála in February 2019 - and called Revised EIA Report (2019). The revisions to the May 2018 EIAR were necessary in order to take account of the Reason for Refusal by Tipperary County Council of UWF Related Works; the 2 No. Tipperary County Council Planner's Reports (dated 06/09/2018 and 10/01/2019); and the Submission to Tipperary County Council on UWF Related Works from NPWS dated 13.12.18. The Revised EIAR also took account of the Refusal by An Bord Pleanála to Grant planning for UWF Grid Connection (ABP-301959-18: Board Order dated 17/12/2018); and the ABP Inspector's Report on UWF Grid Connection (dated 27th November 2018) and evaluated the cumulative effects of a preliminary route for the UWF Grid Connection 110kV UGC along the R503 Regional Road, through Newport town and on the local road network to the Mountphilips Substation site. It is noted for completeness that the UWF Grid Connection layout presented therein and evaluated in respect of cumulative effects with UWF Related Works differed slightly from the current 2019 application for UWF Grid Connection, (i.e. the 110kV UGC route now by-passes Newport town).

The full **Revised EIA Report (2019) including mapping and figures for UWF Related Works** is included in Volume F1: Reference Documents for Other Elements of the Whole UWF Project.

An extract from Volume F, comprising a **detailed description** of the UWF Related Works (presented in a format similar to 5.2 to 5.5 above) along with a **copy of the accompanying figures** is included in Appendix 5.3: Description of Development (UWF Related Works).

5.6.1.2.2 Location and Characteristics of UWF Related Works

The UWF Related works comprises of the following:

Internal Windfarm Cabling of c. 17.9km in length, to connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables within ducts in trenches 1.25m deep and 0.6 wide. The majority (11.1km) of the Internal Windfarm Cabling will be installed under Consented Upperchurch Roads or Realigned Windfarm Roads. The remainder of the Internal Windfarm Cabling will be installed in agricultural lands (4.6km), forestry lands (2.1km and forestry felling of 0.1ha), and crossing under 9 No. public roads (40 meters). The cabling will traverse the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin.

The Internal Windfarm Cabling consists of electrical cables and communication cables and the copper conductor cables which are installed inside High Density Polyethylene (HDPE) ducting in underground trenches. The trench will be excavated, ducting and warning tapes installed and trench backfilled and reinstated. When the ducting installation is finished and the trench reinstated, the electrical, communication and copper conductor cables will then be pulled through the ducting. The only surface expression of the Internal Windfarm

Cabling will be the over-ground identification marker posts and marker plates which will be installed at regular intervals above the cables trench

Realigned Windfarm Roads to realign the Consented UWF Roads at three locations; (1) The consented windfarm road to Turbine No.5 in Shevry is 560m in length, and will replace this road in its entirety with a new road 230m in length through forestry. This will require forestry felling of 0.2ha; (2) The consented windfarm road between Turbine No.19, Turbine No. 20 and Turbine No. 21, is 840m in length. It will replace 370m of this road with a new road also 370m in length. 220m of this road will be located on grassland field, with the remaining 150m in length located on existing farm road. The existing farm road section will be upgraded during construction works; (3) A short length (30m) of new access road is between the consented windfarm roads in Knockmaroe to the new Telecom Relay Pole.

Haul Route Works are along public road verges, roadside boundaries and grassland fields in order to widen parts of the L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 by between 0.5m and 1.5m and to widen an entrance off the R503 by 30m. These works will facilitate the delivery of turbine components to the Upperchurch Windfarm site and will take place in the following townlands: Shevry, Knockcurraghbola Commons, Knocknabansha, Knockmaroe and Grousehall. Works include the removal of soils and laying of crushed stone and hard-core in roadside verges for 1710m in total; temporary removal and reinstatement of 1035m of hedgerow and earthen banks which form roadside boundaries; permanent removal of 25m of roadside boundary and the construction of 290m temporary access roads on private lands.

The **Telecom Relay Pole** will relay communication signals around the Consented UWF Turbines in order to avoid interference from the operating Upperchurch Windfarm. The Telecom Relay Pole will comprise a wooden pole, up to 18m in height, with relay equipment attached to the top of the pole. A small compound, 5m X 5m in size, will enclose the relay pole, along with a ground based outdoor cabinet 2m high, 1.2m long and 1m wide and ancillary equipment. The compound will be securely fenced with 2.4m high palisade fencing; a native hedgerow will be planted around the compound on the berm created from the excavations. A communications and low voltage (LV) electricity supply will be cabled to the compound, from the existing supply at the Foilnaman mast, by 300m in length of underground cabling.

RW Ancillary Works will facilitate the construction of the UWF Related Works and will include a change of use for an existing agricultural entrance to agricultural and forestry entrance in permanent use, and 14 No. temporary site entrances; 5300m of temporary access roads; temporary and permanent watercourse crossings, involving 24 No. small field drains and 8 no. streams; drainage systems around permanent features and temporary drainage around works areas; 0.3 hectares of forestry to be felled; temporary and permanent hedgerow/tree removal; temporary and permanent fencing, temporary goal posts and bat crossing structures; relocation of 5 No. existing telephone poles; 11,830m^3 of material will be excavated and temporarily stored for subsequent reinstatement or permanently placed in berms; reinstatement of roadside boundaries and public road surfaces.

Environmental Protection Measures: A suite of Project Design measures, similar to UWF Grid Connection Project Design Measures, will be implemented during the construction of UWF Related Works. These measures along with Management Plans for Traffic, Surface Water, Waste and Invasive Species, will be implemented through a UWF Related Works Environmental Management Plan, the implementation of which will be monitored by a full time Environmental Clerk of Works. A description of the Environmental Protection Measures for UWF Related Works is provided in Appendix 5.3: Description of Development (UWF Related Works. The UWF Related Works Environmental Management Plan is included in Volume F4: Reference Documents for Other Elements of the Whole UWF Project.

5.6.1.2.3 UWF Related Works: Construction, Operation & Decommissioning

UWF Related Works Construction Phase: All elements of the Whole UWF Project will be constructed at the same time and is expected to commence in 2020/2021 and will take approx. 12 months. 5 of the c.100 persons working directly on the Upperchurch Windfarm site will work on UWF Related Works. A specialist communication engineering crew, made up of c. 2 personnel, will be involved in the erection and set up of the Telecom Relay Pole. The UWF Related Works, 23 No. loads of concrete and 292 No. loads of aggregate will be transported to the site by HGV, from local suppliers. A further 2 No. loads of road surfacing material and 43 No. loads of specific building materials will also be imported to the site, from various suppliers in the Region.

UWF Related Works Operational Phase: Upperchurch Windfarm has been granted permission to operate for 25 years from the date of commissioning. UWF Related Works will operate for the same period as the windfarm. The personnel employed in operation and maintenance of Upperchurch Windfarm will also maintain the UWF Related Works.

UWF Related Works Decommissioning: The UWF Related Works will cease to function following the decommissioning of the Upperchurch Windfarm. The Internal Windfarm Cables will be pulled from the ducts and will be re-used off-site or recycled in a licensed recycling facility. Realigned Windfarm Roads will be left in situ, for use by the landowner. Haul Route Works will be left in situ. The Telecom Relay Pole and compound will be removed and the footprint of the compound will be reinstated with the soils from the surrounding berms.

UWF Related Works use of Natural Resources: 20.9 hectares of land within the full UWF Related Works construction site which is reduced to just 25m^2 around the Telecom Relay Pole compound, during the operational phase; 4750m^3 of topsoil, 6670m^3 of subsoil and 360m^3 of rock will arise from excavation works; small amounts of potable and non-potable water will be imported onto the site as required; 170m of hedgerow and 4 No. trees will be removed and the equivalent amount replanted following construction.

UWF Related Works Emissions: Insignificant dust, construction machinery exhaust, noise, vibration and light will be emitted during the **Construction Stage**. During the **Operational Stage** there will be negligible dust, vehicle exhaust, noise, vibration and light emitted. The operational electrical plant will be a source of electromagnetic fields but these will not be at levels to cause significant effects.

UWF Related Works Waste: UWF Related Works personnel will use the welfare facilities and waste facilities provided at the Upperchurch Windfarm Site Compound No. 1. At these facilities, waste water will be contained in self-contained units and emptied by a licenced facility. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at Site Compound No.1 and collected by an appropriately licensed waste contractor. There will be minimal general and chemical waste during the **Operational Stage**. This waste will be stored in a designated and secure area at the windfarm site offices and collected by an appropriately licenced operator. Welfare facilities for the Upperchurch Windfarm operation and maintenance personnel will be provided at the windfarm site offices. Any wastes which result from the construction, operation and decommissioning of UWF Related Works will be managed under the Waste Management Plan for the operating Upperchurch Windfarm.

5.6.1.3 Description of Element 3: UWF Replacement Forestry

5.6.1.3.1 Introduction to UWF Replacement Forestry Reports

An **afforestation license** for UWF Replacement Forestry **was granted by the Minister for Agriculture, Food and the Marine on 07/11/2018**. Forest Owner Number FO138819C. Contract Number CN81893. The application for the licence was accompanied by an EIA Report.

The **full EIA Report including mapping and figures for UWF Replacement Forestry** is included with the planning application in Volume F5: Reference Documents for Other Elements of the Whole UWF Project.

An extract from Volume F of the **detailed description** of the UWF Replacement Forestry (presented in a format similar to 5.2 to 5.5 above) along with **a copy of the accompanying figures** is included in Appendix 5.4: Description of Development (UWF Replacement Forestry).

5.6.1.3.2 Location and Characteristics of UWF Replacement Forestry

UWF Replacement Forestry relates to the planting with forestry, of 6ha of agricultural lands the purpose of which is to fulfil the replanting obligation which will arise from the felling of forestry for Other Elements of the Whole UWF Project, namely Upperchurch Windfarm and UWF Related Works. No forestry felling is required for UWF Grid Connection.

Located at Foilnaman townland, near Upperchurch, County Tipperary, 6 hectares (6ha) of agricultural grassland at will be planted with native woodland species, set in clusters of well-matched native species. There will be varied spacing created between the clusters according to Forest Service recommendations. A mixture of tall trees and understory shrubs will be planted, and the design includes wide ride-lines between deeper areas of core woodland. The ride-lines will create open spaces with tree-lined boundaries, which is much favoured by birds of prey during the day (e.g. hen harrier) and bats at night as hunting ground. A mixture of land cover – tall grasses, short grasses and scrub will be maintained under the planting and in the ride lines. Tree guards will be used to protect the saplings and young trees from rabbit damage. A livestock-proof fence will be erected around the perimeter of the planting.

The lands to be afforested are currently in two agricultural landholdings. A small watercourse, with existing culvert crossing, runs through the centre. The existing riparian habitat along this watercourse will be enhanced through planting with hazel, alder and willow species and the entire afforestation land will be protected from livestock by the perimeter fencing.

There is a change of use required for an existing agricultural entrance to agricultural and forestry entrance which will remain in permanent use. This change of use is part of UWF Related Works – RW Ancillary Works.

The UWF Replacement Forestry will be designed and planted in accordance with the Forest Service (2006) Information Note No. 5: Establishment, Design and Stocking Densities of New Native Woodland and Felling and Reforestation Policy published by the Forest Service (May 2017).

Environmental Protection Measures: A number of Project Design measures and Best Practice measures will be implemented during the planting stage of UWF Replacement Forestry. All works and activities associated with UWF Replacement Forestry will be carried out in accordance with its Invasive Species Management Plan. The implementation of the Project Design and Best Practice measures and the adherence to the Invasive Species Management Plan will be monitored and audited by a full time Environmental Clerk of Works. A description of the Environmental Protection Measures for UWF Replacement Forestry is provided in Appendix 5.4: Description of Development (UWF Replacement Forestry). Best Practice measures and the Invasive Species Management Plan are included in Reference Documents for Other Elements of the Whole UWF Project Volume F7: Appendix 5.1 and Appendix 5.2.

5.6.1.3.3 UWF Replanted Forestry: Planting and Growth Stage

Planting Stage: Tree planting will be carried out by 4 No. forestry professionals. Tree saplings, wooden fence posts and fencing wire and gates will be imported to the site by 4WD vehicle.

Growth Stage: Once planted, the trees will go through numerous stages of growth from sapling, through to maturity, old age and eventual decay with natural regeneration occurring through the lifecycle of the native wood. Other than thinning activities and grass/scrub management, natural maturation, old age and regeneration, no other changes to the native woodland are expected. Felling is not planned.

Harvesting: The woodland will be permanent woodland and unlike commercial forestry plantations, the new native woodland will not be harvested or felled.

Use of Natural Resources: 6ha of agricultural land will be planted with mixed species to create a native woodland, comprising tall trees and understory shrubs, along with wide ride-lines, and a mix of tall grasses, short grasses and scrub land cover maintained during the growth stage. This will enhance biodiversity in the area. New trees and shrubs will be set back from the watercourse which runs through the UWF Replacement Forestry site. The existing riparian habitat will be enhanced through the planting with hazel, alder and willow species and the lands will be protected from livestock by the perimeter fence. Planting will be carried out by hand using spades. Small localised patches of disturbed soil will occur at the tree sapling locations.

Emissions – emission levels associated with either Planting or Growth Stage activities will be Negligible, mainly due to the very short duration of work, the planting by hand.

Waste - Planting and Growth Stage – during the planting stage waste such as packaging will be generated in very small quantities and this waste will be removed at source and disposed of in an appropriate licensed facility. No waste is expected to occur during the Growth stage.

5.6.1.4 Overview description of Element 4: Upperchurch Windfarm

5.6.1.4.1 Introduction to Upperchurch Windfarm Reports

An overview description of already consented Upperchurch Windfarm (UWF) is provided hereunder.

An application for planning permission for Upperchurch Windfarm was made to Tipperary County Council in January 2013. The windfarm was permitted by Tipperary County Council in January 2014 and the permission was upheld by An Bord Pleanála in August 2014. The application was accompanied by an EIA Report (known as EIS at the time) and Natura Impact Statement.

A document, with a detailed description of the Upperchurch Windfarm, has been compiled from the original 2013 Upperchurch Windfarm EIS, from the Reply to Further Information, the additional information submitted during the planning process and mitigation measures and planning conditions attaching to the Grant of Permission, to reflect a description of the development as it is now permitted. This compilation document has been prepared in the same format as the current application Chapter 5, for ease of cross referencing. The compilation document can be found in Appendix 5.5: Compiled Description of Upperchurch Windfarm.

The full planning documents, including the Inspectors Report, EIS, RFI and Environmental Management Plans, for the consented Upperchurch Windfarm can be found in Volume F8 & F9: Reference Documents for Other Elements of the Whole UWF Project**.**

5.6.1.4.2 Location and Characteristics of Upperchurch Windfarm

Upperchurch Windfarm will comprise 22 wind turbines with an overall height up to 126.6 metres, 2 meteorological masts with an overall height of up to 80 metres, turbine foundation and crane hardstanding areas, access roads and an electrical substation. The Upperchurch Windfarm site is located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. This is an area 2km west of Upperchurch village and 18km to the west of Thurles, County Tipperary.

The 22 wind turbines, associated crane hardstandings and ancillary works will be constructed on a series of small hills ranging in elevation from 280m to 401m OD, set out generally over four areas. The substation will be constructed in Knockcurraghbola Commons and the turbines will be connected by underground cables to the substation. There will be two meteorological masts erected, one in Grousehall and a second in Knocknamena townlands. Ancillary Works will include borrow pits in Shevry, Knocknamena, Knockmaroe and Grousehall; 1 No. site entrance from the R503 Regional Road at Graniera and; 10 No. site entrances from local public roads, through and around the site, which will provide access to the windfarm.

Upperchurch Windfarm (UWF) is comprised of the following parts:

Consented UWF Turbines - 22 No. wind turbines of the three-bladed, tubular tower model, light grey in colour and an overall height to blade tip up to 126.6m. The turbines will be constructed on concrete bases with an adjacent hard-core hardstand area. There is no requirement for fencing of turbine areas. The turbines will be connected by underground cables to the Consented UWF Substation. The underground cabling forms part of the UWF Related Works application (Internal Windfarm Cabling).

Consented UWF Substation - 110kV substation compound which includes a control building, main transformer and other electrical equipment enclosed in a compound by a palisade fence. The substation will measure 64m x 41m.

Consented UWF Roads - 11.6km of windfarm access roads will comprise 8km of newly built 5m wide roads and 3.6km of existing farm roads which will require upgrading and widening (by average of 2m).

Consented Upperchurch Windfarm Ancillary Works – The main items of ancillary works will include, 2 No. meteorological masts up to 80m in height; 11 No. site entrances; 1 No. stream crossing; site drainage system; 2 No. construction site compounds (Site Compound No.1 at Graniera, and Site Compound No.2 at existing building in Knockcurraghbola Commons); 6 No. borrow pits from which most of the aggregate required will be won; forestry felling, hedgerow removal and reinstatement; excavation, storage and reinstatement of soils.

5.6.1.4.3 Upperchurch Windfarm: Construction, Operation & Decommissioning

Upperchurch Windfarm Construction Phase: Construction of Upperchurch Windfarm is expected to commence in 2020/2021 and will take approx. 12 months. Approximately 277 persons will be engaged in the civil, electrical, project management, legal and financial services, material supply and component deliveries for the windfarm. Approximately 950 No. loads of concrete; 15 No. loads of reinforcing steel and 5 No. loads of general building materials and 212 No. loads of electrical plant and equipment (abnormal size loads) will be imported to the site by HGV. The abnormal turbine loads will be transported from Foynes Port.

Upperchurch Windfarm Operational Phase: Upperchurch Windfarm has been granted permission to operate for 25 years from the date of commissioning of the wind turbines, whereupon there will then be an option to apply for continuance of use or decommission the plant and restore the site. There will be 8 permanent jobs created in operation and maintenance activities, legal, electricity sales and asset management during the operational phase.

Upperchurch Windfarm Decommissioning: this will involve the removal of all the turbines, removal of the above ground turbine foundation elements and covering the hardstanding areas with topsoil and reseeding. Any roads or hardstands that are not required by the landowner for farm use, can be covered with topsoil and reseeded also. Cabling will be isolated and left in-situ underground. The substation compound will include an ESB Networks owned control room and a windfarm owned control room. The windfarm owned electrical equipment would be decommissioned and sold as second hand equipment. The ESB substation could remain as part of the national electricity network, after the wind farm site is decommissioned.

Upperchurch Windfarm Use of Natural Resources: 56.3 hectares of land within the construction works site will reduced to 6.4 ha during the operational phase; Approx. 108,000m^3 of excavated soils; 43,000m^3 of aggregate mostly won on-site and otherwise imported from local quarry at Shanballyedmond, Rear Cross; small amounts of potable and non-potable water, sourced at an existing well at the windfarm site offices in Site Compound No. 2; felling of 4.4 hectares of conifers; 960m of hedgerow removed (with an equivalent length of new hedgerow planted).

Upperchurch Windfarm Emissions: Dust, construction machinery exhaust, noise, vibration and light will be emitted during the construction stage. There is no house within 200m of the construction works. During the **Operational Stage** there will be negligible dust, vehicle exhaust, vibration and light emitted. The turbines will emit noise during operation. Permitted noise emissions are prescribed by planning condition. The operational electrical plant will be a source of very low frequency (50Hz) electromagnetic fields but these will not be at levels to cause significant effects at the turbine locations, and no effects will occur at local residences.

Upperchurch Windfarm Waste: During construction, waste water from welfare facilities will be contained in self-contained units and emptied by a licenced operator in an appropriately licenced facility or in the case of the Site Offices, will be treated in the existing septic tank. General and chemical waste will also arise from construction activities and processes. During operation, minimal general and chemical waste will arise on site. All waste will be stored in designated and secure areas, for collection by an appropriately licenced operator. Any wastes which result from the construction, operation and decommissioning of the Upperchurch Windfarm will be managed under a site specific Waste Management Plan.

5.6.1.4.4 Upperchurch Windfarm contribution to Climate Action

Renewable Energy Sources - Electricity (RES-E) contribute to the National Target of 40% of RES-E on the National Grid by 2020. This target was set by the European Commission as part of the EU member's efforts to combat the serious threat of climate change. Every unit (kWh) of electricity generated by clean renewable sources replaces a unit of electricity generated by fossil fuel sources and thereby offsets the pollution (expressed in CO_2e) that would be emitted by fossil fuel generation.

Table 5-9: Upperchurch Windfarm contribution to climate action

Value	Unit	Source
220,000,000 kWh	Kilowatt hours of electricity per annum which will be generated by Upperchurch Windfarm	Predicted production from the 22 Wind Turbines at Upperchurch Windfarm
52,381 houses	houses/per annum that will be supplied with electricity from Upperchurch Windfarm	Based on CRU Figures of 4,200 kilowatt hours of average use per annum per household in Ireland (August 2017). *Review of Typical Domestic Consumption Values for Electricity and Gas Customers (CER 17/003)*
40%	% of all Households in County Tipperary and County Limerick combined, that could be supplied with all of their electricity consumption from Upperchurch Windfarm	Households according to Census 2016 (CSO)
CO_2e offsets: Upperchurch Windfarm will generate 220,000,000 kWh every year without emitting greenhouse gases (GHG) or ash pollution and this will avoid an equal amount of electricity being generated from gas, coal or oil, which do emit GHG. The gases in a GHG bundle (carbon dioxide, methane, nitrous oxide and ozone) are represented by the term CO_2e (Carbon Dioxide equivalent) when discussing offsets. The following section sets out the CO_2e that is emitted by cars and dairy cows and compares those emissions to the savings or offsets in CO_2e from Upperchurch Windfarm (CO_2e offsets) production. It also sets out the amount of forestry that would be required (forestry sequestration or CO_2e absorption) for the same CO_2e offsets contribution, as Upperchurch Windfarm.		
106,216 tonnes	(Greenhouse Gases) CO_2e tonnes per annum that would otherwise be emitted if the 220,000,000 kWh to be generated by Upperchurch Windfarm, was instead generated by gas, coal and oil	Based on the energy intensity of the Irish electricity generation mix of 482.8g CO_2e/kWh (Source: Energy-related CO_2 Emissions in Ireland 2005-2016 (SEAI, 2018))
44,629 cars	Number of cars that would emit the equivalent amount of CO_2e (106,216 tonnes) per annum	Based on Irish Motor Industry June 2018 (2.38 tonnes/per annum CO_2e per car) and Cartell.ie March 2018 (average per car in Ireland 21,025 km/per annum)

Value	Unit	Source
2,079,345 cars	Number of cars in Ireland	CSO 2017
2.15%	% of the cars in Ireland that can be offset by Upperchurch Windfarm production	
5 tonnes	tonnes of CO_2e emitted per cow per annum	Average annual production from a cow (6,000 litre milk) on grass based diet in Ireland results in 5 tonnes of CO_2e emissions per annum. Teagasc (Environment Knowledge Transfer Department 2019)
21,243 cows	Number of cows that would emit the equivalent amount of CO_2e (34,037 tonnes) that can be offsets from Upperchurch Windfarm production	
164,245 cows	Dairy cows in Tipperary	Irish Cattle Breeding Federation numbers for 2017 *(https://www.icbf.com/wp/?p=10601)*
13%	% of the Tipperary dairy cow herd that can be offset by Upperchurch Windfarm production	
8,614 hectares	Equivalent hectares of forestry that would be required if the same amount of CO^2 that Upperchurch Windfarm would avoid, was to be absorbed by growing forest (forestry sequestration)	COFORD estimate that Irish forests on average sequester 3.36 tonnes of carbon per hectare per annum. (Carbon Sequestration in Irish Forests (COFORD 2009). 1 tonne of Carbon = 3.67 tonnes of CO^2. Therefore 1 hectare of Irish forest sequesters 12.33 tonnes per annum of CO^2 The COFORD Council is a body appointed by the Minister for Agriculture, Food and the Marine to advise the Minister and his Department on issues related to the development of the forest sector in Ireland.

5.6.1.5 Overview Description of Element 5: UWF Other Activities

5.6.1.5.1 Introduction to UWF Other Activities Reports

Although UWF Other Activities do not require planning permission, they do form part of the Whole UWF Project and therefore are included in the cumulative evaluations.

A summary description of the UWF Other Activities is provided below. A more **detailed description of these activities,** along with **mapping and figures** is included in Appendix 5.6: Description of the UWF Other Activities.

5.6.1.5.2 Location and Activities of UWF Other Activities

The **Haul Route Activities** will facilitate the transportation of turbine components to the Upperchurch Windfarm site and are located at various points on the national and regional road network along the Upperchurch Windfarm turbine component haul route between Foynes Port in County Limerick and junction of the R503 and R497 Regional Roads in Knockmaroe townland, County Limerick. Activities comprise the laying of matting over verges at up to 5 No. locations, removal and replacement of street furniture (mainly signposts) at 13 No. locations and the trimming of up to 960m of roadside hedgerow/trees at up to 15 No. locations.

The **Upperchurch Hen Harrier Scheme** will enhance and protect habitat for hen harrier in the vicinity of Upperchurch Windfarm, in order to fulfil planning condition No.18, attaching to the windfarm. The Upperchurch Hen Harrier Scheme is located in Knockcurraghbola Commons, Coumnageeha, Foilnaman, Knockmaroe and Grousehall townlands on 128ha of agricultural lands between the Slievefelim to Silvermines SPA and the Upperchurch Windfarm. Activities associated with the Scheme includes once off activities such as planting of hedgerows and trees; enhancement of riparian corridors and scrub/wood areas; and the fencing off of watercourses and newly planted trees and shrubs. The Scheme also includes long-term farm management practices such as management of rush coverage, livestock grazing and the control of the use of lime, fertilizers and burning of gorse, amongst others. Nine local landowners are signed-up to the Scheme. Implementation involves a mix of initial once-off activities which will both create new habitat and protect and enhance existing habitat; and on-going farming practices which will result in the long term maintenance of hen harrier habitat.

Monitoring Activities will monitor the Whole UWF Project for compliance with the environmental protection measures and mitigation measures detailed in the Upperchurch Windfarm 2013 EIS and 2013 RFI (including the Construction Environmental Management Plan for Upperchurch Windfarm and the Ecological Management Plan for Upperchurch Windfarm); Planning Conditions attaching to the already consented Upperchurch Windfarm; and measures in the UWF Grid Connection EIA Report (2019), the UWF Related Works Revised EIA Report (2019) and the UWF Replacement Forestry EIA Report (2018), environmental protection measures set out in the Description of UWF Other Activities (see Appendix 5.6), and the Environmental Management Plans for UWF Grid Connection, UWF Related Works and Upperchurch Windfarm. Monitoring will also involve the supervision and recording of key construction activities, and monitoring of progress of land reinstatement. Operational stage monitoring will include monitoring of the success of Upperchurch Hen Harrier Scheme throughout the operational lifetime of Upperchurch Windfarm. Monitoring will also include operational planning conditions and Ecological Management Plan compliance.

Overhead Line Activities include re-sagging activities and potential fibre wrapping activities which will be carried out by ESB Networks. The purpose of the re-sagging activities is to correct the tension of the existing overhead line, following the installation of the UWF Grid Connection End Masts, so that the lines are held within predefined tension parameters. The purpose of fibre wrapping is to provide a communication link to the newly installed Mountphilips Substation. The tension will be corrected on 2 no. Sections - i) between

ESBN Angle Mast Structure No. 79 (c.200m south of Mountphilips substation) to New Mountphilips End Mast No. 1 and ii) between New Mountphilips End Mast No. 2 and ESBN Angle Mast Structure No. 90 (2.3 km north of Mountphilips substation). Wrapping the overhead line with fibre optic cable from Killonan ESBN substation (just east of Limerick City) to Mountphilips substation. The Overhead Line Activities will be carried out according to industry standard method statements, including standard health & safety and environmental management systems.

Environmental Protection Measures: A number of environmental protection measures will be implemented during the carrying out of UWF Other Activities. These environmental protection measures will be incorporated into their respective Environmental Management Plans, as appropriate. For example, measures which are relevant to Monitoring of UWF Grid Connection works will be incorporated into the UWF Grid Connection Environmental Management Plan. A description of the Environmental Protection Measures for UWF Other Activities is provided in Appendix 5.6: Description of UWF Other Activities.

5.6.1.5.3 UWF Other Activities: Construction, Operation & Decommissioning

Timing: The **Haul Route Activities** will occur prior to commencement of turbine component haulage and reinstatement will occur immediately after the passage of all components. The initial once-off activities associated with the **Upperchurch Hen Harrier Scheme** such as permanent planting and fencing of newly planted areas and watercourses will be carried out during the same period as the construction of Upperchurch Windfarm and UWF Related Works. There will be pre-construction **Monitoring Activities** before Upperchurch Windfarm and UWF Related Works commence. **Overhead Line Activities** will take place at the same time as the construction of Mountphilips Substation for UWF Grid Connection.

UWF Other Activities Construction Phase: Approximately 50 persons will be engaged in UWF Other Activities including haul route activities, landowners involved in the hen harrier scheme, environmental experts engaged in the monitoring schemes and ESB Crews involved in overhead line activities. There will be very little materials delivered to the activity sites, these will include deliveries of geotextile matting, trees and shrubs, fencing materials and specialist ESB equipment.

UWF Other Activities Operational/Decommissioning Phase: The same **Haul Route Activities** as for the construction phase, will be required in the occasional event of a large component delivery to Upperchurch Windfarm, if required, during the operational phase, and if required during the decommissioning phase of the windfarm. The farming practices required under the **Upperchurch Hen Harrier Scheme** will continue throughout the lifetime of Upperchurch Windfarm. **Monitoring** of the success of Upperchurch Hen Harrier Scheme will be carried out during the operational lifetime of Upperchurch Windfarm. Monitoring will also include surveys for and compliance auditing of operational planning conditions and the operational stage Ecological Management Plan, and compliance with any measures associated with the decommissioning stage.

Use of Natural Resources: No land use changes required. No water or welfare facilities required. No mechanical excavations required; all planting will be carried out by hand. For haul route activities, up to 960m of roadside boundary hedges/treelines will be trimmed, outside of the general bird breeding season. For the Hen Harrier Scheme, 2.2ha of trees, 1.4km of riparian habitat and 2.8km of new hedgerow will be enhanced or created during initial activities. In total 128 hectares of agricultural lands will be management for the benefit of hen harrier.

There will be negligible **Emissions** from vehicles transporting personnel and any general **Waste** arising on-site will be removed by the crew themselves during the **construction** and **operational phase** of these Other Activities**.**

5.6.2 Secondary Projects

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

The addition of Mountphilips Substation will add a new high voltage electrical substation in the Newport area. This may facilitate new connections to the Mountphilips substation in the future. However, there are no new connections planned or proposed at present.

5.6.3 Description of Other Unrelated Projects and Activities

Unlike related off-site projects or secondary projects (which are integral to the subject project or may arise largely because of it), Other Projects or Activities relates to existing or consented (or proposed) projects and on-going activities in the area, which are not connected to the subject project, and which by addition could create larger more significant effects to the environment.

Other Projects & Activities in the area were scoped for inclusion in this assessment, using geographical and time-frame boundaries and conceptual site model exercises. For a full description of this exercise and the results of the scoping see Appendix 2.1: Scoping of Other Projects or Activities for Cumulative Evaluations.

A summary table of the results of this scoping exercise is presented in the Table below. In this Table, the Other Projects & Activities which were SCOPED-IN for cumulative evaluation in the environmental topic chapters are listed on the Y- axis and the relevant Environmental Factor topic is identified on the X - axis.

Table 5-10: List of Other Projects or Activities scoped-in for Cumulative Evaluation

Other Project or Activity *(These projects are identified on Figure CE 2.1: Other Projects or Activities Scoped In for Evaluation in the Environmental Factor Topic Chapters and are identified using the ID number on the mapping)*	**6. Population**	**7. Human Health**	**8. Biodiversity**	**9. Land**	**10. Soils**	**11. Water**	**12. Air**	**13. Climate**	**14. Material Assets: Built Services**	**15. Material Assets : Roads**	**16. Cultural Heritage**	**17. Landscape**
Killonan to Nenagh 110kV Overhead Line							■					
Shannonbridge – Killonan 220kV Overhead Line							■					
Potential Bunkimalta Windfarm and Consented Grid Connection	■	■	■			■		■	■			
Consented Castlewaller Windfarm and Potential Grid Connection	■	■	■			■	■	■	■	■		
Existing Milestone Windfarm			■								■	■
Existing Rear Cross Quarry			■									
Existing Foilnaman Mast											■	■

Section 5.6: Description of Other Projects included in Cumulative Evaluations

Other Project or Activity *(These projects are identified on Figure CE 2.1: Other Projects or Activities Scoped In for Evaluation in the Environmental Factor Topic Chapters and are identified using the ID number on the mapping)*	**6. Population**	**7. Human Health**	**8. Biodiversity**	**9. Land**	**10. Soils**	**11. Water**	**12. Air**	**13. Climate**	**14. Material Assets: Built Services**	**15. Material Assets : Roads**	**16. Cultural Heritage**	**17. Landscape**
Existing Cummermore Communications Pole											■	■
Proposed Quarry at Curraghduff			■									
Consented Newport Town Park			■			■						
Activity – Forestry, in the surrounding area			■									■
Activity – Agriculture, in the surrounding area			■									
Activity – Turf Cutting			■									
All operating wind turbines in the Irish State								■				

Description of the Development – UWF Grid Connection

Chapter 5

Relevant Volume C3 EIAR Figures

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

Relevant Volume C4 EIAR Appendices

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

A brief overview of each of the above listed projects is provided over.

5.6.3.1 Electrical Utilities

Existing Killonan to Nenagh 110kV Overhead Line: A high voltage (110kV) overhead line which runs between Killonan Station and Nenagh ESB substation (County Tipperary). The existing line is located to the west of the UWF Grid Connection and does not pass over the route of the 110kV UGC. The new Mountphilips Substation will be connected to this line via two new End Masts in farmland, west of the substation compound.

Shannonbridge – Killonan 220kV Overhead Line: A high voltage (220kV) overhead line which runs between Shannonbridge ESB substation in County Offaly and Killonan ESB substation in County Limerick. A section of the line passes close to the UWF Grid Connection 110kV UGC in the townlands of Coole and Mountphilips.

5.6.3.2 Energy - Windfarms

Milestone Windfarm is an existing 4-turbine windfarm located adjacent to the southwest of the consented Upperchurch Windfarm, with 3 No. turbines consented under planning ref: 12510385 at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry and 1 No. turbine consented under planning ref: 1410 at Inchivara and Knockduff. Milestone Windfarm comprises 4 No. wind turbines (each with a maximum tip height of 126m) along with new access tracks, and electrical substation, and associated works. The grid connection associated with Milestone Windfarm is towards the south at ESBN Cauteen Station, cabled along the public road network. The UWF Grid Connection 110kV UGC and UWF Related Works Internal Windfarm Cabling will pass through a landholding associated with Milestone Windfarm, which is located on lands adjacent to Upperchurch Windfarm. An Environmental Impact Statement accompanied the planning applications for Milestone Windfarm – Ref: 12510385 & 1410.

Milestone Windfarm is constructed and therefore there will be no construction works during the construction of the subject development or any of the other elements of the Whole UWF Project. Therefore there will be no overlap of construction periods.

Consented Castlewaller Windfarm & Potential Grid Connection:

Consented Windfarm: 16 turbines and associated hardstands, electrical substation, internal underground cables, internal access roads, upgrading of existing internal access roads, borrow pits, expansion of drainage system and ancillary works. An Environmental Impact Statement and Natura Impact Statement accompanied the planning application 11/51/0251 for Castlewaller Windfarm.

Potential Grid Connection: The grid connection for Castlewaller Windfarm is neither currently consented nor proposed. In SID pre-application consultation, commenced in December 2018 with An Bord Pleanála for the grid connection element of Castlewaller Windfarm, the applicant (ABO Wind Ireland) indicated underground cabling to connect the windfarm to Killonan Station, near Limerick City. The *potential* route of this grid connection is predominantly on public roads. Part of the grid route is along the L6009-0, just east of Newport Town which will also be used for the UWF Grid Connection 110kV UGC. A *potential* site entrance off the R503 via an existing forestry entrance (along the UWF Grid Connection route) was also included in the SID Pre-Application consultations for the grid connection. It is assumed that any future application for the grid connection would be accompanied by an EIA Report. ABP Ref. 303293-19.

Overlap of Construction Periods: Although Castlewaller Windfarm is not likely to be constructed during the same period as UWF Grid Connection (because the Castlewaller Windfarm has not yet been offered a grid connection from EirGrid, and has to obtain planning consent for its grid connection), there is some possibility that this windfarm could be built during the same period as UWF Grid Connection, and therefore the Castlewaller Windfarm project is included in the cumulative evaluation on a precautionary basis.

In relation to downstream water quality and SACs: the consented windfarm is entirely located in the Newport (Tipperary)_SC_010 sub-catchment upstream of the Lower River Shannon SAC. The route of the *potential* grid connection is assumed, for the purposes of this EIA Report, to be routed along the public road, as indicated during the aforementioned SID Pre-Application consultations. And therefore it is assumed that the potential grid connection will be located in two of the same sub-catchments as UWF Grid Connection - Kileengarrif_SC_010 and Newport (Tipperary)_SC_010. The construction of the Castlewaller Windfarm and potential grid connection will involve both instream works and works in close proximity to watercourses. It is assumed that any future proposal for the grid connection will include Best Practice environmental protection measures, including surface water runoff and invasive species management, which will ensure adverse effects to the integrity of downstream SACs are avoided.

In relation to Hen Harrier and the SPA: Castlewaller Windfarm is also located within the Slievefelim to Silvermines SPA, with turbines located c.1.2km to the north of the UWF Grid Connection where the 110kV UGC is routed along the R503. This windfarm is located within areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts. As per planning conditions, Castlewaller Windfarm will be subject to significant management plans in respect of Hen Harrier. The potential grid connection is routed along forestry/windfarm roads and public roads where it occurs within the SPA. It is assumed that any future proposal for the grid connection will include protection measures for Hen Harrier which will ensure adverse effects to the integrity of the SPA are avoided.

Potential Bunkimalta Windfarm & Consented Grid Connection:

Potential Windfarm: c.34MW wind farm in potentially the same general location as the previously consented (and now annulled) windfarm comprising wind turbines, substation compound, access tracks, anemometer masts, potentially borrow pits and soils storage areas and associated site works. The potential windfarm is assumed, for the purposes of this EIA Report, to be located in the same townlands as the previous application – i.e. Bunkimalta, Bauraglanna, Lackabrack, Knockfune and Foilduff at Keeper Hill.

Consented Grid Connection: The Bunkimalta Windfarm (should it be permitted in the future) is expected to connect to the National Grid via the already consented underground grid connection to the existing Nenagh Substation, on the outskirts of Nenagh town. The consented grid connection comprises the installation of approximately 22.25km of 38kV underground cable (UGC) between Bunkimalta Wind Farm and Nenagh 110kV substation, to be installed primarily in public roads. Bunkimalta Windfarm is located c.3.5km to the north of the UWF Grid Connection. Modifications to the existing entrance from the L-2163 to the Keeper Hill Coillte Forest. The consented Grid Connection was accompanied by Environmental Reports. Planning Ref: 16600433 and 16600432.

Overlap of Construction Periods: Although it is not expected that the Bunkimalta Windfarm will be constructed at the same time as Upperchurch Windfarm or UWF Grid Connection (due to the recent annulment of the Bunkimalta Windfarm planning permission following the European Court of Justice ruling C-164/17), this project and its associated gird connection are nonetheless included in the cumulative evaluation on a precautionary basis. For the purposes of this EIA Report, the Bunkimalta Windfarm is assumed to be located in the same general area (as previously proposed), in the northern part of the upland area. The Bunkimalta Windfarm is assumed in this report to be similar to the previous application for 16 no. turbines and a substation compound.

In relation to downstream water quality and SACs: The potential (future) Bunkimalta Windfarm is assumed to be located within both the Kileengarrif_SC_010 sub-catchment and the Newport (Tipperary)_SC_010 sub-catchment, within the catchment area of the Lower River Shannon SAC. The grid connection (consented) is predominately within the public road corridor to Nenagh town and also is partially located within the Kileengarrif_SC_010 and Newport (Tipperary)_SC_010 sub-catchments, though it is not located close to the UWF Grid Connection. The *potential* Bunkimalta Windfarm is located upstream of the UWF Grid Connection only.

The construction of the *potential* Bunkimalta Windfarm and associated grid connection will involve both in-stream works and works in close proximity to watercourses. It is assumed that any future proposal will involve surface water and invasive species controls in line with Best Practice. It is assumed that any future proposal for a windfarm will include Best Practice environmental protection measures, including surface water runoff and invasive species management, which will ensure significant impacts to downstream SACs are avoided.

In relation to the Hen Harrier and the SPA: It is assumed, for the purposes of this EIA Report, that the *potential* Bunkimalta Windfarm will be located within the Slievefelim to Silvermines SPA, with turbines potentially located c.5km to the north of the UWF Grid Connection 110kV UGC route. Due to its location within an SPA, it is assumed that any future proposal for a windfarm will include protection measures for Hen Harrier which will ensure significant impacts to the SPA are avoided, and that any future proposed Bunkimalta Windfarm will only proceed where the windfarm can be developed without causing adverse effects to the integrity of the SPA.

It is assumed that any future application for the windfarm would be accompanied by an EIA Report and Natura Impact Statement.

Operating Wind Turbines in the Irish State: All wind turbines generating Electricity from Renewable Energy (RE-E). The generating capacity as of June 2019 was 3,700 MW installed throughout the country at 250 No. windfarms.

5.6.3.3 Quarries

Rear Cross Quarry: Rearcross Quarry is an operational quarry (8.5ha) which exists at Shanballyedmond townland c.1km to the south of the 110kV UGC along the Regional Road R503. The quarry is located in the Shannon regional catchment, to the south of Rear Cross village. Quarry operations only interface with 110kV UGC works at the point of egress from the quarry access road onto the R503. Hen Harrier and water protection measures form part of the planning conditions and licences for this quarry which ensure adverse impacts on European Sites are avoided. This project was accompanied by Environmental Reports and Appropriate Assessment Screening (Stage 1) Report. Planning Ref: 11510323

Note: the supply of aggregate to the UWF Grid Connection and Other Elements of the Whole UWF Project will be supplied as part of the consented capacity of the Rearcross Quarry, and no expansion of the quarry is required in relation to this supply.

Curraghduff Quarry: This quarry is currently in the planning permission process at Further Information Stage. (Tipperary County Council Ref. 19600317). The extraction of sandstone from a 3.585ha disused quarry site, which includes site entrance and access laneway. It is intended to extract between 590,000 - 690,000m^3 of sandstone and to install temporary settlement ponds. Quarry works to entail removal of sandstone by blasting and mechanical digger, dry screening and crushing and restoration of the area on completion of works. This application was accompanied by an NIS.

5.6.3.4 Utility - Existing Communication Structures

Foilnaman Mast: An existing communications mast comprising a 30m steel lattice mast structure at Knockmaroe townland, in the vicinity of the UWF Related Works/Upperchurch Windfarm site. Planning Ref: 10510462

Cummermore Communications Pole: An existing communications structure comprising a 20m support pole, c.2km to the southwest of the Upperchurch Windfarm, and within 4km of the UWF Related Works (Telecom Relay Pole). This existing pole carries radio aerials and a communications dish and associated equipment. Planning Ref: 14600313

5.6.3.5 Public Recreational Facility

Newport Town Park: A recently consented public park on lands immediately adjacent to the Newport River within the urban area of Newport town. The new park will incorporate children's play area, play equipment, zip wire, outdoor gym equipment, pump track, multi-use games area, recreational walkways, seating, signage, interpretive panels, landscaping and car parking. The development of Newport Town Park will involve excavations and groundworks within the boundary of the Lower River Shannon SAC. However, there will be no instream works, nor works within 5m, of the Newport River. Sediment control and water quality protection measures will be implemented, as conditioned by planning consent. Funding secured. To commence in 2019/2020 Planning Ref: PL92.302960

5.6.3.6 Activities – Forestry, Agriculture, Turf Cutting

Forestry in the Surrounding Area: General forestry activities in commercial conifer plantations in the surrounding area, includes management of growing forests, along with planting, thinning and harvesting activities. Roughly half of the surrounding landuse in the upland area relates to forestry.

Agriculture in the Surrounding Area: Agriculture is widespread throughout the study area and predominately comprises hill farming with more intensive grassland farming occurring at lower altitudes. General agricultural activities on agricultural lands in the surrounding area, includes dry stock farming, mainly cattle, along with some dairy farming, and some sheep farming. Roughly half of the surrounding landuse in the upland area relates to agriculture.

Turf-Cutting: General turf cutting activities which occur in pockets of peatlands in the surrounding upland area. Turf cutting carried out both mechanically and by hand, with cut-over bog evident at a number of locations including at Bleanbeg Bog, Cummermore, Gortmahonoge and at Cummer (Mulloghney).