APPROPRIATE ASSESSMENT REPORT 2021

Appropriate Assessment Report 2021

for

Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm, Co Tipperary

Stage 1: Screening for AA

Stage 2: Natura Impact Statement

(April 2021)

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Contents

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

This Appropriate Assessment Report has been prepared by Inis Environmental Consultants to facilitate the Competent Authority carry out an Appropriate Assessment for the Proposed Larger Turbines and Met Masts at the already authorised Upperchurch Windfarm, County Tipperary.

The preparation of this Appropriate Assessment Report has had regard to;

- EU Habitats Directive (92/43/EEC),
- EU Birds Directive (Council Directive (2009/147/EC) the Part XAB of the Planning and Development Act 2000,
- European Communities (Birds and Natural Habitats) Regulations 2011,
- Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2001),
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (2010).
- Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC (European Commission, 2018).

1.1 Authors and Contributors to the present report

This report has been prepared by Donncha O Cathain, Esther McMorrow Donnellan, and Megan Doyle with contributions from Howard Williams, of Inis Environmental Consultants Ltd, who have carried out an examination and analysis of the Proposed Larger Turbines and Met Masts Amendment to the already authorised Upperchurch Windfarm in the context of the Whole Upperchurch Windfarm (UWF) Project.

1.2 Legislative Context

Article 6(3) of the Habitats Directive requires that, in relation to European designated sites (i.e. SACs and SPAs that form the Natura 2000 network), "*any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives*".

Under Article 6(3) of the Habitats Directive, an Appropriate Assessment of the implications of a project for the European Site concerned implies that, before a project is approved, all the aspects of the project which can, either individually or in combination with other plans or projects, affect the conservation objectives of that European Site must be identified, in light of the best scientific knowledge in the field. A competent authority can only agree to a plan or project after having determined that it will not adversely affect the integrity of the site concerned.

Under article 6(4) of the Directive, if adverse impacts are likely, and in the absence of alternative options, a plan or project must nevertheless proceed for imperative reasons of overriding public interest (IROPI), including social or economic reasons, a Member State is required to take all compensatory measures necessary to ensure the overall integrity of the European site. The European Commission have to be informed of any compensatory measures adopted, unless a priority habitat type or species is present and in which case

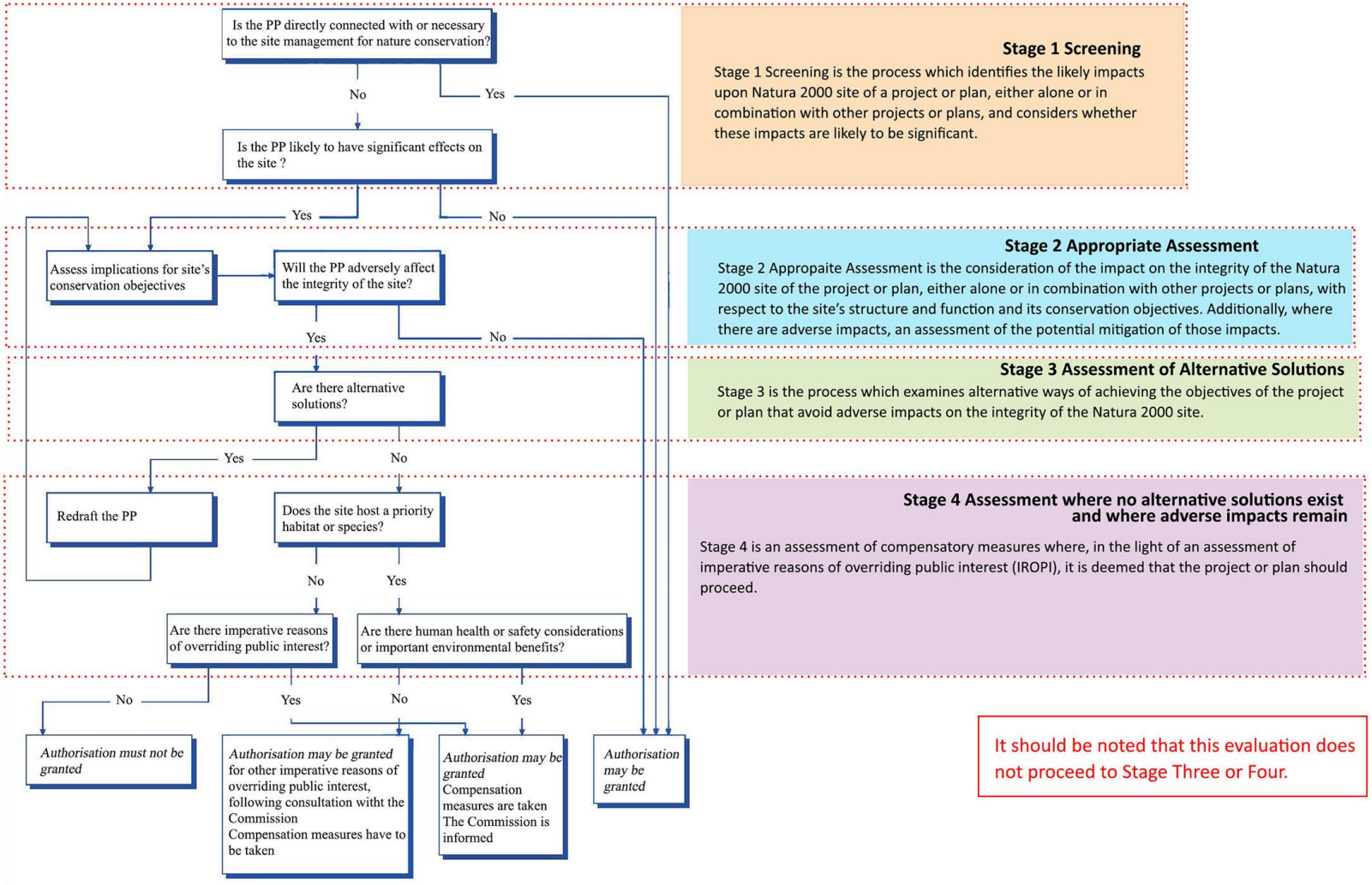
an opinion from the European Commission is required beforehand (unless for human health or public safety reasons, or of benefit to the environment).

1.2.1 Stages of the Appropriate Assessment Process

Appropriate Assessment involves a number of steps and tests that are applied using a stage-by-stage approach. Each step or stage in the assessment process precedes and provides a basis for other steps. The four stages in an Appropriate Assessment (AA), as outlined in EC Guidance on Assessment of Projects[1] are illustrated in the following flow chart (over).

[1] Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001

STAGES OF THE APPROPIATE ASSESSMENT PROCESS FOR A PLAN OR PROJECT (PP)



Source: Flow Chart and Description Notes from Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001

1.3 Consideration of In-Combination Effects

1.3.1 In-combination effects of the Whole Upperchurch Windfarm (UWF) Project

The Proposed Larger Turbines and Met Masts are a proposed amendment to the Authorised Upperchurch Windfarm. As a whole project, the Upperchurch Windfarm also includes a number of Other Elements.

All of the Element projects of the Whole UWF Project are included in the cumulative evaluations – i.e.

- Upperchurch Windfarm (authorised);
- Proposed Larger Turbines and Met Masts (proposed amendment to the authorised windfarm);
- UWF Related Works (authorised);
- UWF Grid Connection (authorised); and
- UWF Replacement Forestry (authorised);
- UWF Other Activities (do not require planning).

1.3.2 In-combination effects of the Whole UWF Project with Other Projects and Activities

The following Other Projects are evaluated in relation to in-combination impacts with the Whole UWF Project (including the Proposed Larger Turbines and Met Masts):

1. Other unrelated projects which are located within the water sub-catchments of the Whole UWF Project or within 2km of the Slievefelim to Silvermines SPA boundary and which were scoped in for cumulative evaluation (see Appendix 2021 A2 Scoping of Other Projects and Activities), these projects are:

- existing Rear Cross Quarry,
- existing Milestone Windfarm (including 2 permitted, but not built, turbines),
- consented Castlewaller Windfarm (and *potential* grid connection),
- *potential* Bunkimalta Windfarm (and consented grid connection),

2. The following **land-use activities** which occur in the surrounding area are also relevant to the cumulative evaluations:

- Agriculture
- Forestry
- Turf-Cutting.

2 Description of the Project

The subject development, Proposed Larger Turbines and Met Masts, is a proposed amendment to the authorised Upperchurch Windfarm. The applicant, Ecopower Developments Ltd seeks to amend the size of the authorised Upperchurch Windfarm turbines to larger turbines and to amend the size and design of the authorised met masts to larger met masts which will have a lattice rather than a tubular tower design.

2.1 Whole Upperchurch Windfarm (UWF) Project

The Proposed Larger Turbines and Met Masts amendment will form part of the Upperchurch Windfarm development, which in turn is part of a larger whole project – the Whole Upperchurch Windfarm (UWF) Project.

Upperchurch Windfarm as a whole project (Whole UWF Project) includes the following elements:

1. Authorised Upperchurch Windfarm (includes 2020 authorised amendment to windfarm substation);
2. This amendment to the authorised windfarm – Proposed Larger Turbines and Met Masts;
3. UWF Related Works;
4. UWF Grid Connection;
5. UWF Replacement Forestry; and
6. UWF Other Activities.

See AA 2021 Figure 1: Location of the Whole Upperchurch Windfarm (UWF) Project, AA 2021 Figure 2a: Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm and layout of Other Elements in close proximity and AA 2021 Figure 2b: Layout of the Whole UWF Project on Discovery Mapping

Elements 1, 3, 4, and 5 were subject to environmental assessment as part of their consent process, these assessments are sources of information for this Appropriate Assessment Report 2021, and comprise the following Reference Documents:

Reference Document 1 of 36: Upperchurch Windfarm Grant of Permission with Conditions and An Bord Pleanála Planning Inspector's Report 2014

Reference Document 2 of 36: 2013 Upperchurch Windfarm Environmental Impact Statement (incl. Natura Impact Statement)

Reference Document 3 of 36: 2013 Upperchurch Windfarm Response to Request for Further Information from Tipperary County Council (incl. Revised Natura Impact Statement)

Reference Document 4 of 36: 2020 Amendments to Upperchurch Electrical Substation (incl. Grant, Planning Report, Screening for EIA and Screening for AA)

Reference Document 5 of 36: Non-Technical Summaries for each Element of the Whole UWF Project

Reference Document 6 of 36 to 17 of 36: UWF Related Works - Grant of Planning, Inspector's Report and 2019 Revised EIAR (including Appendices & Figures), EMP and AA Reporting

Reference Document 18 of 36 to 25 of 36: UWF Grid Connection - Grant of Planning, Inspector's Report and 2019 EIAR (including Appendices & Figures), EMP and AA Reporting

Reference Document 26 of 36 to 36 of 36: 2018 UWF Replacement Forestry EIAR (including Appendices & Figures) and AA Reporting

These documents can be found in the Reference Document 1 of 36 to Reference Documents 36 of 36 accompanying this Appropriate Assessment Report 2021 and online at www.upperchurchwindfarmamendments.ie.

The various Elements of the Whole UWF Project, including the Proposed Larger Turbines and Met Masts, are described in Sections 2.2 to 2.7 below. **The Proposed Amendment is described at Section 2.3**.

Other unrelated projects and activities, which are considered for in-combination effects with the Whole UWF Project are described in Section 2.8.

2.2 Upperchurch Windfarm

2.2.1 Planning Consent Overview

An application for planning permission for Upperchurch Windfarm was made to Tipperary County Council in January 2013 and was granted permission by Tipperary County Council in January 2014, with the planning permission upheld by An Bord Pleanála in August 2014. The Authorised Upperchurch Windfarm relates to 22 No. wind turbines, overall height of up to 126.6 meters, 2 No. met masts up to 80 meters in height with wind measuring equipment attached, access roads, electrical substation compound and control buildings and ancillary site works. The 2013 planning application was accompanied by an Environmental Impact Statement and a Natura Impact Statement, and a Revised Natura Impact Statement was submitted with the Response to RFI in Novmeber 2013. . The duration of planning is for 10 years. The windfarm is not yet constructed. (An Bord Pleanála Reference PL 22.243040: LA File Ref. 13/51/0003).

In 2020 permission was granted by Tipperary County Council under Planning Ref. 20/1048, for amendments to the Upperchurch Windfarm Electrical Substation, which was previously authorised as part of Upperchurch Windfarm. The amendments were required because of updates to ESB Networks specifications for 110kV substations, which specify larger spacing between electrical equipment, larger control buildings and the provision of welfare facilities within.

The full planning documents for the Authorised Upperchurch Windfarm and the Amendments to Upperchurch Electrical Substation can be found in Reference Document 4 of 36 submitted with this Planning Application and online at www.upperchurchwindfarmturbineamendments.ie.

2.2.2 Location, Size and Design of Upperchurch Windfarm

The Authorised Upperchurch Windfarm comprises 22 No. wind turbines, 2 No. met masts, 22 No. turbine foundation and crane hardstanding areas, site roads and an electrical substation. The windfarm is not yet constructed.

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 windfarm and ancillary works are authorised for a series of hills ranging in elevation from 280m to 401m OD, set out generally over four areas. The electrical substation is authorised for a location in Knockcurraghbola Commons and the wind turbines will be connected by underground cables to this substation. The substation site is adjacent to a private paved road, which is in turn accessed from a public local road (L6188-0, to the north). There are two met masts to be erected, one in Grousehall and a second in Knocknamena townlands. Authorised ancillary

works 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, to provide access to the windfarm.

Upperchurch Windfarm is comprised of the following parts:

Consented Upperchurch Windfarm Turbines - 22 No. wind turbines with an overall height to blade tip up to 126.6m. The authorised turbines will be of the generic three-bladed up-wind rotor, horizontal axis, tubular tower turbines with active pitch regulated variable speed operation. Construction of hard-core hardstanding areas, is authorised adjacent to each wind turbine location to facilitate erection of the turbine during the construction phase and maintenance works during the operational phase. These authorised hardstands are 1470m^2 in plan area. Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground surface. The turbines require the construction of foundations comprising concrete, steel reinforcement and aggregate, designed to engineer's specifications depending on the turbine model chosen. The foundation design will be dictated by the turbine manufacturer and a typical foundation size for larger turbines is shown in UWF-PA1-01 as 20m in diameter and 2.7m in depth, See Drawing Pack accompanying this application. The turbines will be connected by underground cables to the Consented Upperchurch Windfarm 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 original (2013) substation measured 64m x 41m. In December 2020, permission was granted by Tipperary County Council (Planning Ref. 20/1048) for amendments to the Upperchurch Windfarm Electrical Substation, which was previously authorised as part of Upperchurch Windfarm (Planning Ref. 13/520003). The amendments were required because of updates to ESB Networks specifications for 110kV substations, which specify larger spacing between electrical equipment, larger control buildings and the provision of welfare facilities within. The following amendments were authorised;

- Increase the size of the hardcore compound yard of the authorised substation, from 2176m² to 3107m² in area (68.64m x 45.27m), by extending out the perimeter palisade fencing. This is to accommodate a change to the layout of electrical equipment in the compound yard, and a change in size and design of the two control buildings.
- Increase one of the control buildings from 99.67m² to 176.8m² (17m x 10.4m), with self-contained welfare facilities to be installed. Both control buildings will increase in height from 6.4m to 7.05m and 8.36m.
- No increase in the authorised hardcore area, because the extended yard can be accommodated on the previously authorised windfarm road area outside the substation fencing. The hardcore drainage system, which includes a settlement pond, will remains as previously authorised. Also, under the newly authorised design layout only part of the hardcore area will be excavated to the previously authorised level. The amended control buildings will be built on different levels, with the taller of the two buildings on the lower level (2m below). This will result in the control buildings presenting to the viewer, as of similar height as previously authorised.
- No change to the location of the substation - the amended substation is within the previously authorised substation hard cored area. The substation compound is located in a grassland field, adjacent to a forestry plantation.

A Screening for AA report accompanied the application. See Reference Document 4 of 23.

Consented Upperchurch Windfarm 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.

2.2.3 Upperchurch Windfarm: Construction, Operation & Decommissioning

Upperchurch Windfarm Construction Phase: Construction of Upperchurch Windfarm is expected to commence in 2022 and will take approx. 12/18 months to complete. 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. It is expected that the turbine components 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. Four maintenance personnel will be permanently employed at the windfarm site to service, maintain and monitor the turbines for operational safety and performance.

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 hardstanding areas that are not required by the landowner for farm use, can be covered with topsoil and reseeded also. The authorised windfarm substation compound will include an ESB Networks owned section and a windfarm owned section. The ESBN section of the windfarm substation will most likely remain as part of the national electricity network, after the wind farm site is decommissioned. Any equipment associated with the wind farm owned part of the substation will be electrically isolated and removed off site, sold as second hand equipment or disposed of appropriately.

Upperchurch Windfarm Use of Natural Resources: In relation to agricultural lands, the Authorised Upperchurch Windfarm will utilise 46.3 hectares of agricultural land within the construction works site which will reduce 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 the local Rear Cross 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: The main welfare facilities on the Upperchurch Windfarm construction site will be provided at Site Compound No.1. Additional welfare facilities are also available at the unoccupied house at Site Compound No.2, this house will be the Site Office during the operational stage of the windfarm. 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.

2.3 2021 Proposed Amendment to the Authorised Upperchurch Windfarm

2.3.1 Current Proposal for Larger Turbines and Met Masts

Twenty-two wind turbines and two met masts are already authorised as part of the Upperchurch Windfarm (not yet built). Ecopower Developments now proposes to increase the size of the turbines from up to 126.6m to up to 152m and change the met masts height and design.

Proposed Larger Turbines: The current proposal is to increase in the size of the authorised wind turbines from upto 126.6 meters maximum blade tip height to wind turbines upto 152 meters maximum blade tip height, by increasing the wind turbine hub heights to within a range of between 89 meters and 94 meters in height and increasing wind turbine rotor diameters to within a range of between 112 meters and 117 meters in diameter.

The proposed larger turbines will be of the same design as the authorised turbines but with longer blades and a taller hub. The proposed larger turbines will have a generation capacity in the 3.5MW to 4.2MW range. This is a considerable increase on the generation capacity of the authorised turbines (2MW to 3MW range).

The grid connection for Upperchurch Windfarm has a capacity of 94MW. As outlined in Table 2-1 below, the optimisation of the windfarm through the installation of larger turbines with greater generation capacity, can substantially fill this grid connection capacity. Also, any wind turbines proposed for connection to the National Grid must be Grid Code compliant, as is required by Eirgrid (Transmission System Operator TSO). Examples of typical turbines in the 3.5MW to 4.2MW range, which are available on the Irish market and are Grid Code Compliant, are set out in Table 2-1 below;

Table 2-1: Typical Turbines in the range

Model	Overall height to uppermost tip (m)	Hub Height	Rotor Diameter (m)	Generation Capacity (MW) per turbine	Total Generation Capacity
Vestas V117	152	93.5	117	4.2	92.4
Enercon E115	149.85	92	115.7	4.2	92.4
Nordex N117	149.5	91	117	3.6	79.2
Vestas V112	145	89	112	3.45	75.9

This application is to increase the size the authorised turbines within a specified tip height and hub height range. In the context of the constant evolution of wind turbine technology, this approach to the application will allow flexibility for the most cost-effective and efficient technology available at the time of turbine procurement, to be

installed. In the recent EC Guidance on wind energy developments and EU nature legislation (Nov 2020)[2] a 'design range' approach is considered. The guidance states that compliance of a 'design range' with the Habitats Directive can be achieved by assessing the 'worst case scenario'.

Proposed Larger Met Masts: It is an Eirgrid requirement that continuous site meteorological information, independent of the wind turbines but generally at hub height, is available to the Transmission System Operator (TSO). The Authorised Upperchurch Windfarm includes 2 no. Met Masts with a height of 80m and of tubular tower design. The current proposal is to replace the 2 no. authorised 80m high tubular tower met masts with maximum in height, 93.5m lattice tower masts. See Drawing of Meteorological Mast UWF-PA1-07 in the Drawing Pack accompanying this planning application. There will be no change in location of the met masts. The proposed larger met masts will be installed at the same locations as the authorised 80m masts.

2.3.2 Application under Section 37E of the Planning & Development Act 2000 (as amended)

Following consultations under section 37B of the Planning and Development Act, 2000 as amended, the Board served notice under section 37B(4)(a) that it is of the opinion that the proposed development falls within the scope of paragraphs 37 A(2)(a) and (b) of the Act. Accordingly, the Board has decided that the proposed development would be strategic infrastructure within the meaning of section 37A of the Planning and Development Act, 2000, as amended. Any application for permission for the proposed development must therefore be made directly to An Bord Pleanála under section 37E of the Act. (Case Number: ABP-307690-20).

Relevant Figures:

AA 2021 Figure 1: Location of the Whole Upperchurch Windfarm (UWF) Project

AA 2021 Figure 2a: Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm and layout of Other Elements in close proximity

AA 2021 Figure 2b: Layout of the Whole UWF Project on Discovery Mapping

[2] Commission notice Guidance document on wind energy developments and EU nature legislation Brussels, 18.11.2020 C(2020) 7730 final – Section 3.5 Dealing with uncertainty in assessing and authorising wind energy development

2.3.3 Summary of Changed and Unchanged elements of the Authorised Development

It is proposed to change the following components of the Authorised Upperchurch Windfarm:

Changes to the Authorised Wind Turbines:

- Increase the overall maximum tip height from 126.6m to 152m,
- Increase in turbine hub height from up to 81.6m to a hub height within the range 89m-94m,
- Increase turbine rotor diameter within the range 112m to 117m.
- Increase the generation capacity from 2 to 3MW to 3.45MW to 4.2MW

Changes to the Authorised Met Masts:

- Increase the height of the Met Masts from 80m to a maximum of 93.5m, and
- Change the structure from a tubular tower to lattice tower structure.

Increased Benefits for Climate Action:

- Increase in RE-E production thus improving CO_2e offsets by 80%;

There will be no change to the remaining components of the authorised Upperchurch Windfarm:

- No changes to the locations of the authorised turbines or of the authorised met masts;
- No changes to the authorised Windfarm Electrical Substation;
- No changes to the authorised windfarm site access roads, as these roads can accommodate the Proposed Larger Turbines and Met Masts;
- No changes of the authorised crane hardstanding areas or to the authorised turbine foundations. The authorised hardstanding areas are adequately sized to cater for larger turbines and the concrete, steel and aggregates required for the foundations for the larger turbines will be in line with the requirements for the authorised turbines. This is because the original foundations and hardstanding areas were designed with headroom inbuilt, in order to cater for whichever turbine type was eventually chosen;
- No additional excavations or imported rock required for the construction of the Proposed Larger Turbines and Met Masts. Therefore the size and volume of the authorised borrow pits and stone requirements do not need to increase;
- No changes to the haul route for construction materials or turbine components including outsized components during the construction phase, and there will be no change to access requirements during the operational phase;
- No changes to ancillary works such as the site entrance, watercourse crossing, drainage systems, site compounds, borrow pits or fencing;
- No additional forestry felling or hedgerow removal is required for construction;
- No changes to the use of Natural Resources (Land, Excavated Soils & Rock, Windtake) during construction or operation;
- No material change to emissions during construction (dust, noise, vibration and light) or emissions during operation (noise, EMF, shadow flicker);
- No change to Waste levels or treatment during construction or operation;
- No changes to levels of site activity, use of machinery, number of personnel or traffic during construction or operation;
- No changes to the decommissioning procedure.

- There will be no changes to the 2013 Sediment & Erosion Control Plan or to the 2013 Ecological Management Plan due to the proposed larger turbines and met masts. The proposed amendment will be constructed and operated in accordance with these Plans.
- There is a change to the 2013 Preliminary Environmental Management Plan, which has been updated to include the Proposed Larger Turbines and Met Masts amendment, and accompanies this planning application as: Upperchurch Windfarm Environmental Management Plan 2021 - Updated to include the Proposed Larger Turbines & Met Mast.)

2.4 UWF Related Works

UWF Related Works relates to enabling works at the Upperchurch Windfarm. UWF Related Works comprises Internal Windfarm Cabling, Realigned Windfarm Roads, Haul Route Works, Telecom Relay Pole and RW Ancillary Works.

2.4.1 Planning Consent Overview

The UWF Related Works Element was authorised by An Bord Pleanála on the 8th February 2021. Planning file Reference 303634-19) (Tipperary County Council Ref. No. 18/600913).

Reference Document (with this Planning Application)

Reference Document 6 of 36 to 17 of 36: UWF Related Works - Grant of Planning, Inspector's Report and 2019 Revised EIAR (including Appendices & Figures), EMP and AA Reporting for the complete environmental information.

A summary description of UWF Related Works is provided below.

2.4.2 Location, Size and Design 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 Upperchurch Windfarm Turbines to the Consented Upperchurch Windfarm 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 Upperchurch Windfarm Roads at three locations; (1) The consented windfarm road to Turbine No.5 in Shevry is 560m in length, and a Realigned Road 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 Realigned 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 the main Upperchurch Windfarm construction site entrance (Site Entrance No.1) 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 Upperchurch Windfarm Turbines in order to avoid interference from the operating turbines. 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; forestry felling; 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.

2.4.3 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 construction is expected to commence in 2022. Construction of UWF Related Works 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, levels will be substantially under threshold limits.

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 during the Construction Stage. 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 and at the windfarm substation. 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.

Mitigation Measures: Mitigation Measures, Monitoring Measures and Planning Conditions pertaining to the Authorised UWF Related Works can be found at Section 6.5 of this AA Report 2021.

The Proposed Larger Turbines and Met Masts do not require any changes to any components of UWF Related Works beyond that already evaluated in the Revised Appropriate Assessment Reporting (2019) and authorised by An Bord Pleanála in 2021.

2.5 UWF Grid Connection

UWF Grid Connection relates to the grid connection infrastructure which will connect the windfarm to the national electricity system.

UWF Grid Connection comprises Mountphilips Substation, Ancillary works at Mountphilips Substation Site, and Mountphilips to Upperchurch 110kV Underground Cabling.

2.5.1 Planning Consent Overview

The UWF Grid Connection Element was authorised by An Bord Pleanála on the 8th February 2021. Planning file Reference 22.243040.

Reference Document (with this Planning Application)

Reference Document 18 of 36 to 25 of 36: UWF Grid Connection - Grant of Planning, Inspector's Report and 2019 EIAR (including Appendices & Figures), EMP and AA Reporting for the complete environmental information.

A summary description is provided below to enable a whole project evaluation.

2.5.2 Location, Size and Design of UWF Grid Connection

The UWF Grid Connection will comprise of the following:

Mountphilips Substation: A new substation is authorised 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 2 No. End Masts located at the Killonan – Nenagh 110kV overhead line; a compound, 230 meters east of the overhead line, measuring 95 meters x 94 meters which will contain a control building; 110kV busbars; circuit breakers; line disconnects; current and voltage measuring equipment; cable chairs; surge arresters; lightening protection monopoles and other electrical apparatus. The 2 No. End Masts will be connected to the electrical equipment in the compound via underground cable.

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 Masts 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: Connecting the new substation in Mountphilips by circa.30km in length of underground electrical and telecoms cables (110kV UGC), to Upperchurch Windfarm substation in Knockcurraghbola Commons and thereby connect Upperchurch Windfarm to the National Grid.

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 (22.1km). From there, the 110kV UGC uses the local road network and a private paved road to the Upperchurch Windfarm Electrical Substation. The route is through the townlands of Mountphilips, Coole, Freagh,

Foildarrig, Newport, Tullow, Cooldrisla, Derryleigh, Kilnacappagh, Scraggeen, Derrygareen, Inchadrinagh, Knockancullenagh, Fanit, Lackamore, Tooreenbrien Upper, Tooreenbrien Lower, Reardnogy Beg, Reardnogy More, Shanballyedmond, Baurnadomeeny, Coonmore, Foildarragh, Kilcommon, Loughbrack, Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons.

The 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 (mainly culverts).

The 110kV UGC will be installed in trenches, which will be laid with ducts through which the electrical cables and communications cables will be pulled. The cable lengths will be pulled through and joined together at Joint Bay locations, in joint bay chambers. The ducts will be surrounded by concrete and the trench backfilled with aggregate and the road surface will be reinstated according to Local Authority specifications. The only surface expression of the 110kV UGC will be the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates.

2.5.3 UWF Grid Connection: Construction and Operation *(No decommissioning)*

UWF Grid Connection Construction Phase: Construction of the UWF Grid Connection is expected to commence in 2022 and will take approx. 12 to 18 months. Up to 100 persons will be engaged in the construction project. 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.

UWF Grid Connection use of Natural Resources: Operation Phase: The Land required will reduce considerably to just 2.0ha of land permanently changing use - comprising the footprint of the Mountphilips Substation and access road. 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. This work which will result in very small volumes of crushed stone and sand being temporarily removed from the area directly over the joint bay covers, stored adjacent to the Joint Bay, and re-used to reinstate the top of the Joint Bay following the completion of the repairs.

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.

Mitigation Measures: Mitigation Measures, Monitoring Measures and Planning Conditions pertaining to the Authorised UWF Grid Connection can be found at Section 6.5 of this AA Report 2021.

The Proposed Larger Turbines and Met Masts do not require any changes to any components of UWF Grid Connection beyond that already evaluated in the Appropriate Assessment Reporting (2019) and authorised by An Bord Pleanála in 2021. The Authorised UWF Grid Connection has the technical capacity to accommodate the increased generation from the Proposed Larger Turbines.

2.6 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.

Reference Document (with this Planning Application)

Reference Document 26 of 36 to 36 of 36: 2018 UWF Replacement Forestry EIAR (including Appendices & Figures) and AA Reporting

A summary description is provided below to enable a whole project evaluation.

2.6.1 Consent Overview

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 a Natura Impact Statement.

2.6.2 Location, Size and Design of UWF Replacement Forestry

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).

2.6.3 UWF Replacement Forestry: Planting & Growth Stages

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 at least 10m 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.

2.7 UWF Other Activities

2.7.1 Planning Consent Status

Although UWF Other Activities do not require planning permission, they do form part of the Whole UWF Project and therefore are included in the 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 the *2019 EIAR for UWF Grid Connection* as Appendix 5.6: Description of the UWF Other Activities - see Reference Document 21 of 36: 2019 UWF Grid Connection EIA Report – Volume C4: EIAR Appendices (Part 1 of 2).

2.7.2 Location and Overview 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 Tipperary. 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)[3]; 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 (Reference Document 21 of 36: 2019 UWF Grid Connection EIA Report – Volume C4: EIAR Appendices (Part 1 of 2) - 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

2.7.3 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, UWF Related Works and UWF Grid Connection 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

[3] The mitigaiton and monitoring measures and the environmental management plans for the Upperchurch Windfarm have been updated to include the Proposed Larger Turbines and Met Masts - see Upperchurch Windfarm nvironmental Management Plan 2021 (Updated to Include the Proposed Larger Turbines & Met Masts) which accompanies the current 2021 planning application.

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 during the **construction** and **operational phase** of these Other Activities.

Relevant Figure:

AA 2021 Figure 1: Location of the Whole Upperchurch Windfarm (UWF) Project

AA 2021 Figure 2a: Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm and layout of Other Elements in close proximity

AA 2021 Figure 2b: Layout of the Whole UWF Project on Discovery Mapping

2.8 Other Unrelated Projects and Activities (considered for in-combination effects)

The following Other Projects are considered for in-combination impacts with the Whole UWF Project:

Other unrelated projects which are located within the water sub-catchments of the Whole UWF Project or within 2km of the Slievefelim to Silvermines SPA boundary and which were scoped in for evaluation (see Appendix 2021 A2 Scoping of Other Projects and Activities, these projects are:

- existing Rear Cross Quarry,
- existing Milestone Windfarm (*and also including the two permitted but not built turbines*),
- consented Castlewaller Windfarm (and *potential* grid connection),
- *potential* Bunkimalta Windfarm (and consented grid connection).

and

the following **land-use activities** which occur in the surrounding area are also relevant to the evaluation of in-combination effects:

- Agriculture
- Forestry
- Turf-Cutting.

A summary description of each of the above listed projects is provided below.

Planning documentation and environmental reports for unrelated projects available on Tipperary County Council website. Planning reference numbers for unrelated projects are listed in Appendix 2021 A2 Scoping of Other Projects and Activities. A Desktop Review of Tipperary County Council and An Bord Pleanála websites in 2020 and again in 2021 found that there have been no new turbines granted or proposed within 20km of Upperchurch Windfarm.

Rearcross Quarry (existing)

Existing quarry using blasting and hydraulic excavators on a total site area of 8.5ha. Activities involve extraction of aggregate, processing of the extracted material using mobile plant and screening and crushing prior to stockpiling for sale off site. Restoration/rehabilitation of the entire quarry site will take place following the completion of extraction, as per planning conditions. This quarry is just south of Rear Cross village at Shanballyedmond townland. The quarry is located ca.1km to the south of the route of the 110kV UGC along the Regional Road R503. This project was accompanied by Environmental Reports and Appropriate Assessment Screening (Stage 1) Report. Planning Ref: 11510323. *Note: the supply of aggregate to 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.*

In relation to downstream SAC sites: The operational Rearcross Quarry is located in the regional River Shannon (Mulkear) catchment and physically straddles both the Killeengarriff_SC_010 and Bilboa_SC_010 sub-catchments. There is no spatial overlap between the Rearcross Quarry and the UWF Grid Connection 110kV UGC works. Quarry operations only interface with the 110kV UGC works at the point of egress from the quarry access road onto the R503, the quarry operations themselves are ca.2km from the R503. One watercourse crossing (W39) occurs within 50m of the quarry entrance, however no new instream works or culvert replacement works are associated with the authorised 110kV UGC at this location. In relation to the SPA: the Rearcross Quarry is located within the SPA, 10ha of lands are management for the benefit of Hen Harrier.

Milestone Windfarm (4 turbine existing windfarm, *with two permitted turbines not built*)

Milestone Windfarm is an existing 4-turbine windfarm located adjacent to the southwest of the authorised 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. The existing 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. Two additional turbines, consented under planning ref: 12510385, were not constructed in 2018, but are taken into account herein as there is *potential* that these two turbines could be constructed at some future date. A Natura Impact Statement accompanied the planning applications for Milestone Windfarm – Ref: 12510385 & 1410..

In relation to the SPA: Milestone Windfarm is located outside the SPA. Effective Habitat Loss of Hen Harrier habitat occurs were suitable habitat is present within 250m of each existing/permitted turbine (n=6) location. An area of lands at Knockcurraghbola Commons is managed as part of a Hen Harrier Management Area for the lifetime of the windfarm for the benefit of Hen Harrier- comprising 10.8ha. This includes rush management, nutrient management, weed control, and the maintenance of edge habitat- all of which will benefit prey items such as small mammals and ground nesting passerine species of birds for Hen Harrier.

Castlewaller Windfarm (consented windfarm and *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. A 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 Appropriate Assessment Reporting. ABP Ref. 303293-19.

Overlap of Construction Periods: Although Castlewaller Windfarm is not likely to be constructed during the same period as the Whole UWF Project (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 the Whole UWF Project, and therefore the Castlewaller Windfarm project is included in the cumulative evaluation on a precautionary basis.

In relation to downstream SAC sites: the consented Castlewaller 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 AA 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. No Otter was recorded in baseline studies to inform the Castlewaller Windfarm EIS.

In relation to 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. The Castlewaller Windfarm is at a substantial separation distance from the Upperchurch Windfarm and UWF Related Works. 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.

Bunkimalta Windfarm (*potential)* windfarm and associated 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 and c.9.5km to the northwest of the Upperchurch Windfarm and UWF Related Works. Modifications to the existing entrance from the L-2163 to the Keeper Hill Coillte Forest. The consented Bunkimalta grid connection was accompanied by a Natura Impact Statement. 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 EIA Report to be similar to the previous application for 16 no. turbines and a substation compound.

In relation to downstream SAC sites: 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 *potential* Bunkimalta Windfarm is located upstream of the UWF Grid Connection only. 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 construction of the *potential* Bunkimalta Windfarm and associated grid connection will involve both instream 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 adverse effects to the integrity of downstream SACs are avoided. No Otter was recorded in baseline studies to inform the original Bunkimalta Windfarm planning application.

In relation to the SPA: It is assumed, for the purposes of this AA 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 adverse effects to the integrity of the SPA are avoided, and that any future proposed Bunkimalta Windfarm will have to prove that effects to Hen Harrier will not be significant (in the context of its location within a Hen Harrier SPA).

It is assumed that any future application for the windfarm would be accompanied by a Natura Impact Statement.

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.

Hill farming constitutes roughly one half of the land use within the Slievefelim to Silvermines Mountain SPA and is mainly based on the usage of rough grassland. Grazing is a medium ranked activity both in terms of negative and positive impacts on the SPA.

Agricultural activities occur within the catchments of the Lower River Suir SAC, Lower River Shannon SAC, and Clare Glen SAC.

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 land use in the upland area relates to forestry.

In relation to downstream SAC sites: Forestry activities occur within the catchments of the Lower River Shannon SAC, Lower River Suir SAC and Clare Glen SAC. Forestry Services protocols (including water quality protection) define all forestry felling activities and are a condition of each felling license.

In relation to the SPA: Forestry occurs outside and inside the boundary of the Slievefelim to Silvermines Mountain SPA. Approximately half of the SPA is afforested, including both first and second rotation plantations and clear fell areas and forestry is consequently listed as one of the most important activities with high effect on the SPA (High negative rank). Disturbance from forestry operations is part of background trends, limited information is available on magnitude of this however forestry extraction is subject to Forest Service procedure for felling within the Hen Harrier breeding season, this includes full Appropriate Assessment to protect Hen Harriers within SPA's and a requirement to consider an EIA on lands outside of Natura 2000 sites (depending upon the nature of the forestry operations). It is assumed this process will be undertaken for all commercial forestry resulting in no likelihood of significant effects or adverse effects on site integrity.

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).

Turf-Cutting is also a medium ranked negative pressure on the Slievefelim to Silvermines Mountain SPA.

3 Consultation & Sources of Information

3.1 Consultation

Proposed Larger Turbines & Met Masts: Consultation (including in relation to scoping) regarding the proposed amendment to the authorised windfarm was conducted with statutory consultees and other relevant bodies in 2020.

Consultations took place with Tipperary County Council in June 2020 and with An Bord Pleanála in October 2020.

In addition, consultation letters (dated 7th October 2020) were sent to the Department of Communications, Climate Action & Environment, Developments Application Unit (the Manager), Inland Fisheries Ireland, Environmental Protection Agency and An Taisce. A DAU case reference number was received (G Pre00084/2020 / WA-CON-A200519-0027), however no feedback relevant to this Appropriate Assessment Report was received from these bodies.

3.1.1 Consultation previously conducted for the Whole UWF Project

UWF Related Works: Consultation (including in relation to scoping) with statutory consultees and other relevant bodies between August 2015 and January 2019. Consultees included the Developments Application Unit (the Manager), National Parks & Wildlife Services (Dr. Jervis Good) and Inland Fisheries Ireland (Michael Fitzsimmons and Frank O'Donoghue). Consultation with these statutory bodies, including the information provided and feedback received, is summarised in Table 3-1:

Table 3-1: UWF Related Works - Consultation with Statutory Bodies

Date	Consultees	Action
06/06/17	DAU NPWS IFI BWI BCI	Scoping document outlining up-to-date project amendments, ecological surveys to date, a brief synopsis of ecological survey results to date, in addition to an overview of potential impacts resulting from UWF Related Works.
27/7/2017	NPWS	Watercourse crossings, biosecurity, marsh fritillary, forestry felling and replanting as well as proposed mitigation measures for bats and hen harrier.
23/8/2017	IFI	Conference Call between Mr. Howard Williams, Mr. C. Cullen (INIS) and Mr Michael Fitzsimons (IFI) in respect of watercourse evaluations in terms of fisheries importance and crossing methods. Further to the call Mr. Fitzsimons confirmed via email that a review and discussion of crossings had taken place. Mr. Fitzsimons also confirmed that the crossing methodologies are in line with the methodologies discussed during the scoping inspection carried out with Howard Williams.
27/08/17	NPWS	Information meeting between Dr. Jervis Good (NPWS, Divisional Ecologist), and Mr. Howard Williams (INIS). This meeting provided an update of the project for NPWS staff and a discussion on each receptor within the project study area.
13/12/2017	NPWS	Project Overview. Final formal meeting with NPWS. Attendees were Mr Pat Foley (NPWS Deputy Regional Manager), Ms Julie Brett (Ecopower) and Mr Howard Williams and Chris Cullen (Inis). Mr Williams gave a full project overview to Mr Foley. Mr Foley acknowledged this and stated that he would pass on any pertinent details to Dr Good.

UWF Grid Connection: Consultation (including in relation to scoping) with statutory consultees and other relevant bodies between January 2019 and July 2019. Consultees included the Developments Application Unit (the Manager), National Parks & Wildlife Services (Ms. Aine Lynch) and Inland Fisheries Ireland (Michael Fitzsimmons and Jane Gilleran). Consultation with these statutory bodies, including the information provided and feedback received, is summarised in Table 3-2:

Table 3-2: UWF Grid Connection Consultation with Statutory Bodies

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

3.2 Sources of Information

Other sources of Information, which were considered during the preparation of this AA Report 2021 included:

- Conservations Objectives, Site Synopsis and Site boundary information for European Sites considered possibly within Zone of Influence of the development;
- Information on ranges of mobile QI populations in Volume 1 of NPWS' Status of EU Protected Habitats and Species in Ireland (NPWS, 2019a), and associated digital shapefiles obtained from the NPWS Research Branch;;

- Information on ranges of mobile SCIs bird populations from Bird Atlas 2007–11 (Balmer et al., 2013); excluding birds of prey whose ranges were determined with reference to Hardey et al. (2013);
- Distribution records for QI and SCI species of European sites held online by the National Biodiversity Data Centre (NBDC);
- Details of QIs/SCIs of European sites within the National Biodiversity Action Plan 2017-2021 (DoCHG, 2017);
- Review of sensitive biodiversity receptors on the site and environs via the Environmental Sensitivity Mapping Tool;
- Mapping of European site boundaries and Conservation Objectives for relevant sites and beyond, as relevant;
- Information on groundwater aquifers, recharge, and vulnerability available from the online database of Geological Survey Ireland (GSI)
- Data including surface and ground water quality status, and river catchment boundaries available from the online database of the Environmental Protection Agency (EPA);
- EPA online mapping for watercourse features (https://gis.epa.ie/EPAMaps/);
- National and regional surveys of semi-natural habitats, including grasslands (O'Neill et al., 2013), saltmarsh (Devaney & Perrin, 2015; McCorry & Ryle, 2009), and woodland (Perrin et al., 2008);
- Boundaries for catchments with confirmed or potential freshwater pearl mussel (FWPM) Margaritifera margaritifera populations in GIS format available online from the NPWS;
- Location and Layout Mapping for the authorised Upperchurch Windfarm (including the Proposed Larger Turbines and Met Masts amendment); UWF Related Works; UWF Grid Connection; UWF Replacement Forestry and UWF Other Activities;
- Detailed description of the Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm, described in full in Chapter 1: The Proposed Development of the EIAR 2021 (Proposed Larger Turbines & Met Masts Amendment to the Authorised Upperchurch Windfarm EIAR 2021), and a review of the descriptions of the Other Elements of the Whole UWF Project, including construction methodologies;
- Supporting ecological receptor information, including field and detailed bird surveys, described in full in Chapter 8: Biodiversity of the EIAR 2021 which accompanies the planning application; and described in Chapter 8: Biodiversity (and associated EIAR Figures and EIAR Appendices) of the UWF Related Works Revised EIAR 2019 (Reference Documents 7 of 36 to 11 of 36), UWF Grid Connection EIAR 2019 (Reference Documents 19 of 36 to 22 of 36), and the UWF Replacement Forestry EIAR 2018 (Reference Documents 25 of 36 to 30 of 36);
- Environmental protection measures for Upperchurch Windfarm, UWF Related Works, UWF Grid Connection and UWF Replacement Forestry (including the Conditions of Planning Grant, Project Design Measures, and Environmental Management Plans, along with a review of the Best Practice Survey Methods used to inform the Biodiversity evaluations (considered at Stage 2 of this Appropriate Assessment process);
- Review of planning documentation and environmental reports including:
    - Appropriate Assessment (Reference Document 1 of 36 - An Bord Pleanála Planning Inspector's Report 2014) and Revised Upperchurch Windfarm NIS (Malachy Walsh & Partners, 2013) for the now authorised Upperchurch Windfarm (Reference Document 3 of 36: 2013 Response to Request for Further Information from Tipperary County Council (incl. Revised Natura Impact Statement)),

  - Appropriate Assessment (Reference Document 6 of 36:- An Bord Pleanála Planning Inspector's Report 2020) and Revised Appropriate Assessment Reporting (Inis Environmental Consultants, 2019) for the now authorised UWF Related Works (2019 Revised Appropriate Assessment Report For UWF Related Works - Reference Document 13 of 36 to 17 of 36);
  - Appropriate Assessment (Reference Document 18 of 36 - An Bord Pleanála Planning Inspector's Report 2020) and Appropriate Assessment Reporting (Inis Environmental Consultants, 2019) for the now authorised UWF Grid Connection (2019 Appropriate Assessment Report for Upperchurch Windfarm Grid Connection - Reference Document 24 of 36 and 25 of 36);
  - Appropriate Assessment Reporting (Inis Environmental Consultants, 2018) for the now authorised UWF Replacement Forestry (2018 Natura Impact Statement for Whole UWF Project Elements 1 to 5 - Reference Document 31 of 36 to 36 of 36);

- Site visits and field surveys;
- Review of planning documentation and environmental reports for other unrelated projects i.e. Milestone Windfarm, Rearcross Quarry, Castlewaller Windfarm, and Bunkimalta Windfarm, available on Tipperary County Council website, planning reference numbers for unrelated projects are listed in Appendix 2021 A2 Scoping of Other Projects and Activities.

4 Receiving Environment

The context and characteristics of the receiving environment in respect of terrestrial habitats, aquatic habitats, aquatic species and otter (in respect of SAC sites) and Hen Harrier and general bird species (in respect of the SPA) were described in the 2013 EIS and 2013 RFI for Upperchurch Windfarm (Reference Document 2 of 36, the Revised NIS submitted as part of RFI in November 2013 is in Reference Document 3 of 36), and in the Biodiversity Chapters of the EIA Reports for UWF Related Works (Reference Document 7 of 36 - 2019 UWF Related Works Revised EIA Report – Volume C2: Revised EIAR Main Report (Part 1 of 2) - Chapter 8), UWF Grid Connection (Reference Document 19 of 36 - 2019 UWF Grid Connection EIA Report – Volume C2: EIAR Main Report (1 of 2) – Chapter 8) and UWF Replacement Forestry (Reference Document 26 of 36 - 2018 UWF Replacement Forestry EIA Report – Volume C2: EIAR Main Report (Part 1 of 2) – Chapter 8). The descriptions of the Upperchurch Windfarm baseline environment are reproduced here and updated with any additional baseline information relevant to the current Proposed Amendments.

4.1 Aquatic Habitats & Species

In respect of aquatic habitats and aquatic species, the existing environment (of the works areas) comprises surface water bodies and their affected sub-catchment areas within the upper reaches of tributaries draining to the River Shannon and River Suir regional catchments.

4.1.1 Upperchurch Windfarm (including the Proposed Larger Turbines & Met Masts Amendment)

The majority of the Upperchurch Windfarm (20 of the 22 Consented Upperchurch Windfarm turbines, the Consented UWF Substation, both consented Met Masts and associated Upperchurch Windfarm Roads) is located in the River Suir catchment. Only 2 turbines are located within the River Shannon catchment, and these turbines are located locally within the Bilboa River catchment. Within the River Suir catchment, 9 turbines and both met masts are located in the Clodiagh River catchment, 9 in the Owenbeg River catchment and 2 in the Multeen River surface water catchment.

Table 4-1: Summary of Regional and Local Hydrology at the UWF Related Works Areas

Regional Catchment	EPA sub-catchment	EPA Local Surface Water Bodies	No. of Upperchurhc Windfarm turbines in catchment	No. WC Crossings
Suir	Suir_SC_030	Clodiagh (Tipperary)_010	9	0
	Suir_SC_030	Owenbeg_010	9	1
Suir	Multeen[East]_SC_010	Multeen (East)_010	2	0
Shannon	Bilboa_SC_010	Inch (Bilboa)_010	2	0
		Bilboa_010	0 (access road only)	0

See AA 2021 Figure 3a: Surface Water Catchments in the Upperchurch Windfarm area

Due to the elevated nature of the site above the local valleys, drainage within Upperchurch Windfarm is characterised by forestry and agricultural drains. As per the EIS 2013, the Upperchurch Windfarm involves 1 no. watercourse crossings, this watercourse is included in Table 4-3 as WW2 (Class 2). This was classed as a Class 2 watercourse (*Headwater Stream Equivalent to EPA blue line but not mapped – with fisheries value*) during 2019 UWF Revised Related Works EIAR/AA Report preparations.

Freshwater surveys (Q-sampling and physiochemical water quality analysis) were undertaken at the Upperchurch Windfarm site (six locations) in June and August 2012, and again in November 2020. The results of the freshwater surveys indicates that water quality in the area is generally of 'Good' status with 'Good' biological water quality.

Both the Clodiagh (Tipperary)_010 and Multeen (East)_010 sub-catchments are identified as Freshwater Pearl Mussel sensitive catchments , containing other extant populations of this Annex II and Annex IV listed species. In both the Clodiagh and Multeen sub-catchments, Freshwater pearl mussel populations are located downstream and at a distance from the subject development (approximately 17 km and 16 km, respectively).

The upper reaches of the Clodiagh (Tipperary)_010 and Multeen (East)_010 within the study area provide important juvenile habitat for Atlantic salmon, contiguous with the populations within the Lower River Suir SAC downstream; resident Brown trout populations are also supported. Lamprey species, Twaite shad, Allis shad and White Clayed Crayfish were also are identified as sensitive aquatic species in the 2013 EIS for Upperchurch Windfarm, as these species potentially are using aquatic habitats downstream of the windfarm area.

Consideration of the Passage of Time: The data from the surveys on water quality (2012, 2017 and 2020) and the WFD water quality status of the river water bodies in the vicinity of the authorised Upperchurch Windfarm demonstrates a slight improvement in the water quality on these river water bodies. With the exception of the Multeen (East)_010 and the Owenbeg (Tipperary)_010, which remain at the same *Good* water quality status from 2012 to 2020, all river water bodies improved their water quality status (Table 8-3 of the EIAR). This change is not considered to be material in the context of the assessments, and therefore it is considered that the descriptions in the 2013 documents for Upperchurch Windfarm remain relevant to the current evaluation in this AA Report 2021 for the Proposed Larger Turbines and Met Masts.

4.1.2 UWF Related Works

Baseline Context and Character: The majority of the footprint of the UWF Related Works is located within the River Suir regional catchment – mainly in the Clodiagh (Tipperary)_10 local water body in the Suir_SC_030 sub-catchment, with the remainder within the Owenbeg_010 local water body (also part of the Suir_SC_030) and the Multeen (East)_010 local surface water body in the Multeen(East)_SC_010 subcatchment. A small proportion of the footprint of the UWF Related Works is located in the Bilboa_SC_010 sub-catchment of the River Shannon.

Table 4-2: Summary of Regional and Local Hydrology at the UWF Related Works Areas

Regional Catchment	EPA sub-catchment	EPA Local Surface Water Bodies	Internal Cable (km)	HW works	RWR works	No. WC Crossings
Suir	Suir_SC_030	Clodiagh (Tipperary)_010	11.44	HW1 to HW6 HW11 – HW13	RWR1-RWR2	26
	Suir_SC_030	Owenbeg_010	3.84	-	RW3	5
Suir	Multeen[East]_SC_010	Multeen (East)_010	0.88	-	-	0
Shannon	Bilboa_SC_010	Inch (Bilboa)_010	1.45	HW7 to HW10	-	1
		Bilboa_010	0.29	-	-	0

HW Works – Haul Route Works, RWR – Realigned Windfarm Roads

See AA 2021 Figure 3a: Surface Water Catchments in the Upperchurch Windfarm area

UWF Related Works will involve 32 no. watercourse crossings. The majority of watercourse crossings are located off-road in agricultural and forestry lands. UWF Related Works WW2 and UWF Grid Connection W65 are crossing points of the same watercourse.

Watercourse crossing locations, watercourse classifications and the boundary of various sub-catchments are identified in the 2019 Revised EIAR for UWF Related Works on Figure RW 8.4: Aquatic Habitats & Species within the UWF Related Works Study Area, see Reference Document 11 of 36 - 2019 UWF Related Works Revised EIA Report – Volume C3: Revised EIAR Figures).

Table 4-3: Summary of Watercourses within the UWF Related Works study area

Class	Watercourse Description	Watercourse Crossing ID	Total No.	Total With In-Stream Works
Class 1	EPA mapped blue line, major river or stream (fisheries value)	WW19	1	1
Class 2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	WW2, WW4, WW7, WW22, WW28,	5	4
Class 3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	WW14, WW18,	2	2
Class 4	Drain (no fisheries value)	WW1, WW3, WW5, WW6, WW8, WW9, WW10, WW11, WW12, WW13, WW15, WW16, WW17, WW20, WW21, WW23, WW24, WW25, WW26, WW27, WW29, WW30, WW31, WW32	24	18
7	**Total**		**32**	**25**

4.1.3 UWF Grid Connection

Baseline Context and Character: 68 no. watercourse crossings occur within the construction works area boundary associated with the UWF Grid Connection. The majority (63 no.) of which are located in the Lower Shannon & Mulkear River hydrometric area of the River Shannon catchment (crossings W1 to W63), with just 5 No. watercourses located in the River Suir catchment (crossings W64 to W68). The UWF Grid Connection is also located upstream of the Clare Glen SAC.

Where the 110kV UGC leaves the Mountphilips Substation site, it is entirely located on public roads (W4 to W66) and private paved road (W67 to W68) along its route to the Consented UWF Substation. The watercourse crossings are located in the following EPA sub-catchments: Killeengarrif_SC_010, Newport [Tipperary]_SC_010, Bilboa_SC_010 and the Suir_SC_030.

See AA 2021 Figure 3b: Surface Water Catchments - Whole UWF Project works areas

There are three main watercourses along the route of the 110kV UGC, all of which are within the River Shannon catchment; the Newport River (W7 at the Rockvale Bridge), the Clare (Annagh) River (W36 at the Tooreenbrien Bridge) and the Bilboa River (W53 at the Anglesey Bridge). At these crossing locations all three watercourses are evaluated as containing good salmonid habitat, with good/high biological water quality and good ecological status. Crossing works required for the UWF Grid Connection at these three locations will be in the road pavement within the bridge structures, road level raising works and works to increase the height of parapet walls will all be undertaken from the road surface of the bridge.

The Newport River (W7), Clare River (W36) and Bilboa River (W53), which flow through the study area, were generally 4 to 6 metres wide. The smaller Tooreenbrien Lower which occurs at W33 and Foildarragh which occurs at W49 are c.1-2m wide, and the remaining Class 1 or Class 2 watercourses were generally shallow fast flowing streams which ranged between 0.5m and 1m wide.

All 68 no. watercourse crossing locations were subject to a site visit by an aquatic ecologist and surveyed to evaluate fisheries habitat suitability, riparian and instream habitat and potential for protected aquatic species. In summary the majority of watercourse crossings for UWF Grid Connection are characterised as minor streams and land drains, which have been subject to previous anthropogenic modification (arterial drainage, drainage maintenance, channel modification, abstractions, diversions, etc.). This has resulted in the reduction of ecological status and fisheries potential in the majority of cases throughout the catchments. A number of watercourse crossing points are heavily poached by cattle and in poor condition due to effluent run-off. A summary of the results of the field surveys for the UWF Grid Connection is included in Table 4-4.

As per table below, instream works are required at 2 no. watercourses with Fisheries value (at Mountphilips Substation site), with culvert replacement works likely to be required at 1 no. watercourse with Fisheries value.

Table 4-4: Summary of Watercourses within the UWF Grid Connection study area

Class	Watercourse Description	Watercourse Crossing ID	Location	Total No. of Water-courses	Confirmed In-Stream Works	*Potentially* requiring culvert replacement works
Class 1	Fisheries Value: EPA mapped blue line, major river or stream	W5, W7, W8, W9, W14, W18, W33, W36, W38, W39, W45, W49, W53	Public Roads along 110kV UGC	13	0	**1** *(W14)*
Class 2	Fisheries Value: Headwater Stream Equivalent to EPA blue line but not mapped	W1, W3, W65	Agricultural lands at Mountphilips Substation site Public Roads along 110kV UGC	3	**2** *(W1, W3)*	0
Class 3	Low Fisheries Value: Sub-optimal, heavily vegetated, low or no flow during dry periods	W2, W4, W6, W10, W11, W15, W17, W21, W22, W23, W24, W25, W26, W27, W28, W29, W31, W32, W37, W41, W42, W43, W44, W50, W51, W52, W56	Agricultural lands at Mountphilips Substation site (W2), Public Roads along 110kV UGC	27	1	3
Class 4	No Fisheries Value: Drain, no flow	W12, W13, W16, W19, W20, W30, W34, W35, W40, W46, W47, W8, W54, W55, W57, W58, W59, W60, W61, W62, W63, W64, W66, W67, W68	Public Roads and Private paved road along 110kV UGC	25	0	9
	Total			**68**	**3**	**13**

A summary of watercourse crossings on a per catchment basis is presented in Table 4-5.

Table 4-5: Summary of Watercourse Crossings for UWF Grid Connection (110kV UGC)

Regional Catchment	EPA sub-catchments[1]	EPA - Local Surface Water Bodies[2]	Length of 110kV UGC (km)	No. Water-course crossings	No. Watercourses with Fisheries Value – i.e. Class 1 or Class 2	Watercourses with Fisheries Value which will be subject to new Instream Works	Watercourses with Fisheries Value which will be subject to *potential* Culvert Replacement Works
Shannon	Killeengarrif_SC_010	Ballyard_010	1.3	4	2	2 (W1, W3)	0
	Newport[Tipperary]_SC_010	Newport_040	3.5	5	5	0	0
	Killeengarrif_SC_010	Annagh (Tipperary)_030	4	7	1	0	0
		Annagh (Tipperary)_020	8.4	23	5	0	1 (W14)
	Bilboa_SC_010	Bilboa_010	6.4	18	3	0	0
		Inch (Bilboa)_010	5.4	6	0	0	0
Suir	Suir_SC_030	Clodiagh (Tipperary)_010	1.5	5	1	0	0

[1] Catchments are listed from west to east along the UWF Grid Connection route from the Mountphilips Substation to the Consented UWF Substation

2Catchment areas as defined in https://gis.epa.ie/EPAMaps/

4.1.4 UWF Replacement Forestry

The UWF Replacement Forestry is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. One Class 1 stream flows through the UWF Replacement Forestry lands.

See AA 2021 Figure 3b: Surface Water Catchments – Whole UWF Project works areas

4.1.5 UWF Other Activities

The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities.

4.1.6 Aquatic Habitats & Species – Importance, Sensitivity, Trends

Importance: As above, there are three principal rivers which will be crossed by the UWF Grid Connection located in the Lower Shannon & Mulkear hydrometric area of the River Shannon catchment. At the crossing locations, the Newport River (W7) and the Bilboa River (W53) are designated within the Lower River Shannon SAC. The Clare (Annagh) River crossing (W36) is located approximately 9.5 km upstream of the Lower River Shannon SAC designation on this watercourse. This European Site designation terminates at the downstream point of impassable falls, which creates a migratory barrier for Atlantic Salmon and Sea lamprey. Although these three rivers are not listed as Salmonid Waters under Schedule 1 of the S.I. No. 293/1988, all are designated within the Lower River Shannon SAC within the wider study area and support nationally important Atlantic salmon (within the passable reaches) and resident Brown trout populations. Furthermore, all three watercourse crossings on the Newport, Bilboa and Clare (Annagh) Rivers comprise internationally important aquatic instream habitat for additional water-dependant Annex II species, including Brook lamprey and Otter. The Bilboa River and the Newport River are part of the Lower River Shannon SAC and are therefore of International Importance. The Clare (Annagh) River at the crossing point is evaluated as being of National Importance, taking account of the salmonid fisheries value (resident Brown trout); in addition to its connectivity to the Lower River Shannon downstream; and with cognisance of the water-dependant habitats and species it supports.

In the Suir catchment, the Clodiagh (Tipperary) sub-catchment is identified as a Freshwater Pearl Mussel (FPM) sensitive catchment[4], containing other **extant** populations of this Annex II listed species. The Clodiagh River population in north Tipperary is not designated as a qualifying interest within the Lower River Suir SAC; where the conservation objectives for the Lower River Suir SAC relate specifically to the Clodiagh (Portlaw) FPM population[5], which is connected to the River Suir main channel in Co. Waterford. In the Clodiagh River (County Tipperary), extant Freshwater pearl mussel populations are located downstream of the watercourse crossings, within the SAC boundary and at a distance of approximately 17km from the UWF Grid Connection.

The upper reaches of the Clodiagh and Multeen catchments within the UWF Related Works study area and one watercourse along the UWF Grid Connection 110kV UGC route (W68) provide important juvenile habitat for Atlantic salmon, contiguous with the populations within the Lower River Suir SAC downstream; resident Brown trout populations are also supported. The tributaries of these sub-catchments are high gradient watercourses, generally of 'Good' status with 'Good' biological water quality. The upper reaches of these watercourses are therefore evaluated as being of National Importance.

Minor watercourses within the study area which were identified as having fisheries potential (Class 1 or Class 2) are evaluated as being of local importance (higher value). Those watercourses and drains with sub-optimal or no fisheries value (Class 3 or Class 4) are evaluated as being of local importance (lower value), and subsequently scoped out from further evaluation in the impact assessment, in line with guidance (EPA, 2017). Furthermore, a suite of water quality protection measures will be implemented during the construction of UWF Grid Connection and these measures will include all watercourses, regardless of their fisheries value.

Sensitivity: Aquatic ecological receptors, including fisheries, are dependent on prevailing good to high water quality conditions; this includes the chemical water quality character, as well as sediment and nutrient loadings

[4] Sourced from online NPWS dataset, available at: https://www.npws.ie/research-projects/animal-species/invertebrates/freshwater-pearl-mussel/freshwater-pearl-mussel-data

[5] NPWS (2017) Conservation Objectives: Lower River Suir SAC 002137. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

within the affected streams. Both aquatic macroinvertebrates (Freshwater pearl mussel, White-clawed crayfish and pollution sensitive lotic communities generally) and fish communities are sensitive to suspended solids loading (turbidity), as well as the associated effects of siltation within the river channel. Siltation and turbidity have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels and mortality impacts for salmonid eggs (affecting recruitment) and invertebrate life stages within gravel substrates (interstitial spaces). Suspended solids may be mobilised downstream and affect reaches remote from the source of the suspended solids. Furthermore, fish populations and macroinvertebrate communities may be sensitive to vibration affecting the aquatic environment, arising during construction activities such as directional drilling works.

Trends: The Upperchurch Windfarm andUWF Related Works are located in the Clodiagh (Tipperary) catchment and to a lesser degree the Multeen catchment of the River Suir with a small portion of the site within the Mulkear River (Bilboa River) catchment of the River Shannon. The UWF Grid Connection is located in the Killeengarrif_SC_010, Newport[Tipperary]_SC_010, and Bilboa_SC_010 sub-catchments which are part of the Lower Shannon & Mulkear hydrometric area of the River Shannon catchment, and the Clodiagh (Tipperary)_010 local waterbody catchment of the Suir_SC_010 sub-catchment of the River Suir catchment.

Both the Newport River and Clodiagh River catchments were classified as 'catch and release' by IFI in 2019 (Salmon Angling Regulations: Management of the Wild Salmon Fishery 2019) for the conservation of Atlantic Salmon stocks, indicating the ongoing pressures on the salmon populations in these catchments. There is an ongoing and persistent decline in Atlantic Salmon stocks in Irish freshwaters overall, pertaining specifically to the European Sites which list this species as a qualifying interest (NPWS, 2013). Pressures and threats affecting the freshwater habitat of salmon correlate directly to those pressures affecting other aquatic ecological interests including lamprey species, aquatic invertebrates and other salmonids (siltation; channelization; drainage maintenance; invasive species and disease vectors; and direct/diffuse pollution from agriculture, forestry and direct discharges). It is noted that morphological pressures such as barriers to movement or channelisation may have varying adverse significance on different species; for example, affecting salmon differently to lamprey species. As per the 2019 EIAR Chapter 11 – Water (see Reference Document 20 of 36: 2019 UWF Grid Connection EIA Report – Volume C2: EIAR Main Report (2 of 2) – Chapter 11), the Water Framework Directive status of the surface water bodies at the study area is typically Good. The majority of the waterbodies are *Not at Risk* with the exception of the Inch (Bilboa)_010 and Clodiagh (Tipperary)_010 which are reported to be At Risk of not meeting the Water Framework Directive objectives, due to morphological and forestry related effects such as suspended sediment and eutrophication. It is noted that the status and risk characterisations have not been updated in the current RBMP (2018-2021), thus characterisation and water quality status are cited as indicative.

It is assumed in this report that the baseline environment in relation to Aquatic Habitats & Species, as identified above, will be the receiving environment at the time of construction, on the basis of the relative stability of the pertinent aquatic ecological receptors (identified in long-term trends) in the catchments under consideration herein.

4.2 Otter

The territories of otters can stretch for several kilometres; the total length of the home range depends on the availability of food. The smallest territories are thought to occur at coastal sites, where territories may be as small as 2km. The longest territories occur in upland streams where an individual may have to range more than 20km to find sufficient food. Territorial marking typically occurs by means of sprainting or anal secretions. These marks are left mostly at features such as bridge footings, boulders, grass tussocks and stream confluences. Within their territories an individual otter may utilise a number of resting sites within its territory; these can be hidden refuges above ground (couches), or under-ground chambers (holts). Holts tend to be natural crevices, associated with the roots of trees growing along river and lake banks. These natural recesses provide the otter with a holt that has multiple entrances from which the otter can escape if disturbed. Couches occur frequently in dense vegetation and may be associated with frequently used runs and slides into the water. The rearing of cubs occurs within 'natal holts', which are not marked by spraint. Although capable of breeding at any time of the year, a peak in breeding occurs during the summer and early autumn. Otters that live in rivers and lakes tend to be completely nocturnal, described as being crepuscular – activity peaks at dusk and dawn. Otters are principally piscivorous (fish eating), relying predominantly on salmonids (salmon and trout), but also eel and small fish species such as stickleback. However, otters are not limited to fish and feed opportunistically on a range of prey when available: frogs are frequently eaten by otters, and the remains of invertebrates (crayfish), birds and small mammals have also been found in spraints.

4.2.1 Upperchurch Windfarm (including the Proposed Larger Turbines & Met Masts amendment)

Mammal surveys were carried out in 2012 for the 2013 Upperchurch Windfarm EIS and RFI. Mammal surveys were conducted in 2017 at, and in the vicinity of, the Upperchurch Windfarm as part of surveys for UWF Related Works, while some mammal surveys conducted in 2016/2017 and 2019 for UWF Grid Connection overlapped the windfarm area.

No signs or evidence of otter was recorded within the windfarm site during the mammal surveys undertaken for the Upperchurch Windfarm site. However watercourses within and downstream of Upperchurch windfarm site provide potential foraging habitat for otter.

Consideration of the Passage of Time; The habitats within this site have remained largely unchanged since the 2011/2012/2013 surveys for the original Upperchurch Windfarm application. Surveys carried out during the period 2012 to 2020 recorded **no signs or evidence of otter at the windfarm site** during any of the surveys. Therefore, it is considered that the descriptions in the 2013 documents for Upperchurch Windfarm remain relevant to the current evaluation in this AA Report 2021 for Proposed Larger Turbines and Met Masts.

4.2.2 UWF Related Works

No Otter evidence was recorded within the UWF Related Works study area. Otter surveys of the UWF Related Works were also carried out on the 13th July 2017.

4.2.3 UWF Grid Connection

Baseline surveys of the UWF Grid Connection recorded evidence of Otter *(Lutra lutra)* within the study area, however limited evidence of breeding or resting sites is present, primarily due to the placement of the majority of work locations within the public road. No active breeding or resting sites for Otter (Couches and/or holts) are present within 300m of UWF Grid Connection. The Lower River Shannon SAC (site code 002165), which intersects the UWF Grid Connection at certain watercourse crossing locations, is designated for Otter.

A survey of suitable watercourses was carried out in January and May 2019. A total of 26 watercourses were surveyed for Otter, 300m upstream and downstream, which include the Newport River (W7), Clare River (W36) and Bilboa River (W53) and 23 other watercourses (W5, W8, W9, W18, W21, W22, W23, W26, W28, W29, W30, W33, W35, W39, W41, W42, W46, W47, W48, W49, W50, W51 and W52). There were four records of Otter at 3 locations within the UWF Grid Connection study area, consisting of slides (locations where Otters tend to slide down steep banks), and spraints (droppings). One of the four records was recorded along the River Bilboa within the Lower River Shannon SAC, and consisted of an Otter slide, recorded approximately 60 metres downstream of watercourse crossing W53. An Otter spraint was recorded along the Tooreenbrien Lower River, approximately 45 metres downstream of watercourse crossing W33, with an Otter print recorded underneath the bridge structure. The fourth record relates to an Otter slide which was recorded along the Annagh (Clare) River, approximately 135 metres upstream of watercourse Crossing W36.

No active breeding or resting sites (Holts or Couches) were identified within 300m of any watercourse crossing.

No Otters were observed during current surveys, although this is typical in respect of a species where most activity takes place at night.

Survey results are detailed in the 2019 AA Reporting - Appendix A5: Otter Fieldwork & Survey Results and presented on: Appendix A9 - AA Figure 7: Location of Aquatic Habitats, Species and Otter in relation to UWF Grid Connection (see Reference Document 25 of 36 - 2019 Appropriate Assessment Report for Upperchurch Windfarm Grid Connection – Volume E (Volume 2 of 2)).

Previous studies undertaken in January 2017 have recorded Otter evidence within the hinterland of the study area. Otter evidence (Otter path) has previously been recorded on the Munnia stream, east of the Mountphilips Substation compound, this location is >300m from the authorised Mountphilips Substation. An Otter slide was also recorded on the Newport River, approximately 980 metres upstream of the UWF Grid Connection 110kV UGC route. Although occupied territories were not recorded at the downstream locations of these records during the 2019 surveys, considering the territories of Otter can be several kilometres long these records are included (VWT, 2019).

4.2.4 UWF Replacement Forestry

No Otter evidence was recorded within the UWF Replacement Forestry study area.

4.2.5 UWF Other Activities

Records for Otter during UWF Other Activities surveys are limited to an incidental record in January 2018 at an Overhead Line Activity locations, where an old Otter Holt was recorded within the bank of a drainage ditch in the townland of Killonan. An otter pathway located 80 metres west of Angle Mast AM3 was recorded between the Groody River and an adjoining stream, also in the townland of Killonan.

4.2.6 Otter – Importance, Sensitivity & Trends

Importance: Otter are afforded protection under a number of pieces of leglislation/regulation: the Wildlife Act (as amended); EU Habitats Directive 92/43/EEC; Convention on Trading in Endangered Species; and Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats). Otter is listed as a qualifying interest of the Lower River Shannon SAC and of the Lower River Suir SAC, hence, is evaluated as of International Importance, which is equivalent to a Very High sensitivity rating.

Sensitivity: The conservation status of Otter was obtained from the International Union for Conservation of Nature (IUCN) red list, the Habitat Directive Article 17 Reporting, and the NPWS 2009 Red List for Mammals. According to the IUCN Red List, Otter is listed as 'Near Threatened'. According to Habitats Directive Article 17 Reporting: Otter is listed as having 'Favourable' conservation status. According to the Irish (NPWS 2009) Red List: Otter is classified as 'Near Threatened'.

Otters can be sensitive to the direct effects from disturbance/displacement from breeding and foraging ranges as a result of noise and visual intrusion. Although this species shows variable or flexible responses to disturbance - where research from English Nature (Chanin, 2013) suggests indicate that Otters will rest under roads, in industrial buildings, close to quarries, and at other sites close to high levels of human activity. Otters are also sensitive to habitat loss and additive mortality from inadvertent contact with operating machinery or vehicles.

The National Parks & Wildlife Service's Threat Response Plan for the Otter (NPWS, 2009), a review of and response to the pressures and threats to Otters in Ireland, categorized three principal risks implicated in Otter declines across Europe: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution. Biodiversity Ireland identifies roads, motorways, professional passive fishing, pollution to surface waters, along with the removal of riparian habitats and a decline in eel numbers as the main threats to Otter.

Trends: Article 17 reporting suggests there appears to have been a genuine improvement in the status of Otter in Ireland with future prospects evaluated as 'favourable' (NPWS, 2019). A scenario in which the Upperchurch Windfarm projectdoes not take place would result in a continuation of current trends and populations of otter would be expected to remain as described above, i.e. favourable in the case of Otter, in line with prospects nationally. It is assumed in this report that the baseline environment in relation to Otter, as described herein, will be the receiving environment at the time of construction with ongoing trends as identified expected to be reflected during the operational phase.

4.3 Terrestrial Habitats

4.3.1 Upperchurch Windfarm (including the Proposed Larger Turbines & Met Masts amendment)

The habitats on-site as per Fossitt (2000) are dominated by improved agricultural grassland (GA1) with areas of acid grassland (GS3), less managed wet grassland (GS4) and semi improved neutral grassland (GS1). The windfarm area is managed currently for cattle grazing and to a lesser extent commercial forestry. The large pasture fields are bordered by stone walls (BL1), hedgerows (WL1), treelines (WL2), scrub (WS1) and scattered trees (WD5), however grass dominated banks are the prevailing type of field boundary. Extensive areas of plantation coniferous plantation (WD4) also occur in the surrounding area.

See AA 2021 Figure 4: Terrestrial Habitats in the Upperchurch Windfarm area

Within the 2013 EIS, a single (public roadside) record of Japanese Knotweed was recorded within the study area for the Upperchurch Windfarm, with a second infestation of Japanese Knotweed was recorded in Knockcurraghbola Commons townland (c.480m from the nearest Proposed Larger Turbine) within the site boundary during UWF Related Works surveys. No further invasive species were recorded during 2020 surveys.

Consideration of the passage of time: The 2013 planning documents were reviewed and habitats on the authorised Upperchurch Windfarm site were observed during 2020 surveys for the Proposed Larger Turbines. During the period since the 2012 Upperchurch Windfarm habitat surveys, trees and forestry in the area have matured with some plantation areas felled and replanted. Some short forestry roads have been built on forestry firebreaks near the authorised Upperchurch Windfarm substation, and a length of roadside hedgerow has been removed and replaced with a post and rail fence in Knockmaroe townland near the location of UWF Other Activities (Haul Route Activities HW8). Otherwise, there have been no material changes in the makeup of terrestrial habitats on the windfarm site, and it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the evaluations in this AA Report 2021 for the Proposed Larger Turbines and Met Masts. Furthermore, the maturity of trees on the windfarm site has been taken into account in the relevant evaluations in this AA Report 2021 (for example in relation to hen harrier habitat, bat roosts, high nature value of trees etc.).

Therefore, it is considered that the descriptions in the 2013 documents for Upperchurch Windfarm remain relevant to the current evaluation in this AA Report 2021 for the Proposed Larger Turbines and Met Masts.

4.3.2 UWF Related Works

Baseline Context and Character: Terrestrial Habitats within the UWF Related Works study area comprise a mosaic of agricultural grassland, commercial forestry plantations, hedgerows, wet grassland, private roads and public roads.

Twenty-two habitat types (including six types of habitat mosaic) comprising 190.5Ha were recorded. The dominant habitats present is GA1: Improved agricultural grassland (113.38ha or 59.5%), followed by WD4: Conifer plantation (45.45ha or 22%). The remaining habitats are mainly made up of: Wet Grassland (GS4), Scrub (WS1), built land and artificial surfaces (BL3), Wet Heath (HH3) and Upland Blanket Bog (PB2). Linear habitats are primarily composed of Buildings and Artificial Surfaces (BL3), earth banks (BL2), and Eroding/Upland Rivers (FW1).

Habitats (evaluated as of Local Importance (Higher Value) or above) which occur within the UWF Related Works study area comprise:

- 693 meters of Upland/Eroding Rivers (FW1),
- 2.03ha of Upland Blanket Bog (PB2),

- 11.95ha of Wet Grassland (GS4),
- 1.77ha of Scrub and Immature Woodland (WS1/2),
- 2.32ha of Wet Heath (HH3),
- 1.58ha of Dry-humid Acid Grassland (GS3),
- 0.11ha of Dry Siliceous Heath (HH1),
- 0.1ha of Cutover Bog (PB4),
- 1611 meters of Linear hedgerow (WL1) / treelines (WL2).

Non-native invasive plant species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are herein described. A Japanese knotweed or Himalayan knotweed infestation was recorded at 1 location during habitat assessments on the UWF Related Works. The infestation is located at a distance greater than 7 metres of the haul route realignment construction works area boundary.

4.3.3 UWF Grid Connection

Terrestrial Habitats within the UWF Grid Connection study area comprise a mosaic of agricultural grassland, commercial forestry plantations, broadleaved woodland, peatlands, hedgerows, wet grassland, private roads and public roads. Due to the location of UWF Grid Connection mainly along existing public roads within an agricultural setting, for the most part the landscape is dominated by agricultural grassland and other habitats reflective of this e.g. roadside hedgerows, treelines and earth banks, with numerous dwellings, farm buildings and associated gardens, amenity grassland, hedges and lawns.

Within the construction works footprint itself, the Public Road and other built surfaces (BL3) accounts for 24.8ha or 83% of the habitat.

Thirty-seven habitat types (including fifteen types of habitat mosaic) comprising 306.9Ha were recorded along the survey corridor (i.e. within 50m of the construction works areas). The dominant habitats present are buildings and artificial surfaces (BL3) (15%), agricultural grassland (GA1) (36%), wet grassland (GS4) (13%), and a mosaic of built land and amenity grassland (BL3/GA2) (10.5%) which together make up 75% of all habitats present. Conifer plantation (WD4) and Scrub (WS1) have the highest cover of the remaining habitats by area at 8.8%, and 3.5% of the total area respectively. The remaining 13.1% of habitats include mixed/broadleaf/conifer woodland (WD2) (1.9%), riparian woodland (WS5) (1.6%), amenity grassland (GA2) (1.5%) and WS1/GS4 (1%) and a mixture of 27 habitats or habitats mosaics each less than 1% of the overall total within the study area. No Flora Protection Order (FPO) species are present within the construction area boundary.

Habitats of Local Importance (Higher Value) include buildings and artificial surfaces (BL3) (based on possible importance of certain roadside buildings to bats/Barn Owl), scrub (WS1) (importance to local diversity), mixed broadleaf woodland (WD1) (based on importance to birds/mammals), mixed broadleaf/conifer woodland (WD2) (based on importance to birds and mammals), hedgerows (WL1) (level of maturity and value to birds and mammals), tree lines (WL2) (local importance to birds and mammals), and riparian woodland (WN5) (Importance to local diversity and hydrological function). Six linear habitat types comprising Tree lines (WL2), Hedgerows (WL1), Earthen banks (BL2), Drainage ditches (FW4), Depositing/lowland rivers (FW2), and Stone walls (BL1) were also recorded. The total length of linear hedgerow and treelines (or mosaics of both) present within the study area along the survey corridor comprises 39.2km.

Non-native invasive plant species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are herein described. Rhododendron (Rhododendron ponticum) is present at 28 locations. Japanese knotweed or Himalayan knotweed infestations were recorded at 17 locations during habitat assessments on the UWF Grid Connection. Giant hogweed (Heracleum mantegazzianum) was recorded at one location. Locations of non-native invasive plant species are illustrated in 2019 Appropriate Assessment Reporting for UWF Grid Connection - AA Figure 8: Location of Invasive Species in relation to UWF Grid Connection (see Reference Document 25 of 36 - 2019 Appropriate Assessment Report for Upperchurch Windfarm Grid Connection – Volume E (Volume 2 of 2).

Cherry laurel (Prunus laurocerasus) was recorded at 12 locations, this species, while not listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) is listed as a 'High impact' invasive species by O' Flynn et al. (2014). 'Medium impact' non-native invasive plant species (Kelly et al., 2013, O' Flynn et al., 2014) recorded included Sycamore (Acer pseudoplanatus), Pheasant berry (Leycesteria formosa), and Cotoneaster (Cotoneaster spp.). Other non-native plant species of lesser significance were also recorded, these included Box honeysuckle (Lonicera nitida), Snowberry (Symphoricarpus albus), Montbretia (Crocosmia x crocosmiflora) and Bamboo (Subfamily Bambusoideae).

4.3.4 UWF Replacement Forestry

Seven habitat types comprising 11.6Ha were recorded within the UWF Replacement Forestry study area. The dominant habitats present are improved agricultural grassland (GA1), Wet Grassland (GS4) and conifer plantation (WD4) which together make up 10.4Ha or 89% of all habitats present within the UWF Replacement Forestry study area. Scrub (WS1) and built land and artificial surfaces (BL3) make up the majority of the remaining habitats (9%). Linear habitats are primarily composed of spoil and bare ground (ED2), tree lines (WL2), hedgerows (WL1) and earth banks (BL2). The total area of linear hedgerow and treelines (or mosaics of both), comprises 134m within the UWF Replacement Forestry site. No non-native invasive plant species were recorded. Terrestrial Habitats of Local Importance, Higher Value within the UWF Replacement Forestry site are wet grassland (GS4), broadleaf woodland (WD1) and Scrub (WS1). Linear hedgerow and tree lines (or mosaics of both) within the UWF Replacement Forestry site are evaluated as of Local Importance, Higher Value..

4.3.5 UWF Other Activities

Haul Route Activity Locations: Fourteen habitat types comprising 36.4Ha were recorded. The dominant habitats present are improved agricultural grassland (GA1), Built Land and Artificial Surfaces (BL3), Mixed Broadleaf Woodland (WD1) and Dry Meadows and Grassy Verges (GS2) which together make up 30.2Ha or 83.2% of all habitats present. Scrub (WS1), Wet Grassland (GS4) and Amenity Grassland (GA2) make up the majority of the remaining habitats (11.3%). Linear habitats are primarily composed of spoil and bare ground (ED2), Dry Meadows and Grassy Verges (GS2), Hedgerows (WL1), Tree lines (WL2), Hedgerows (WL1) and Earth Banks (BL2). The total area of linear hedgerow and treelines (or mosaics of both) present comprises 2,031m. Japanese knotweed was recorded c.15m from the haul route location HA15 on the R503 east of Ballycahill. This was the only record of non-native invasive plant species associated with the UWF Other Activities survey corridor. The infestation is located at a distance greater than the root spread for this species (i.e. 7 metres) to the activity location.

Upperchurch Hen Harrier Scheme Area: A total of 128 Hectares of land has been put forward as alternative habitat for the Upperchurch Hen Harrier Scheme. The habitat types are a mixture of wet grassland (GS4) and improved grassland (GA1), with some smaller areas of willow scrub. We refer to the consented Upperchurch Windfarm Ecological Management Plan (2013) for further information in this regard (contained in Reference Document 3 of 36 - 2013 Upperchurch Windfarm Response to Request for Further Information).

Overhead Line Activities: A total of 18 habitats were recorded within a 50-metre buffer of the Overhead Line Activities. The majority of the study area was composed of improved agricultural grassland

4.3.6 Terrestrial Habitats – Importance, Senstiviity & Trends

Importance: Habitats of international conservation importance occur at four locations where the UWF Grid Connection passes though the boundary of the Lower River Shannon SAC. These rivers and riparian habitats support habitats and species listed on Annex I and II, respectively, of the EU Habitats Directive 92/43/EEC which are listed as qualifying interests for the Lower River Shannon SAC.

Habitats of National Importance include: Newport River, Clare River, Bilboa River, and Upland/Eroding Streams habitats which are hydrologically connected to the Lower River Shannon SAC and Upland/Eroding Streams habitats which are hydrologically connected to the Lower River Suir SAC, comprising high and good ecological status surface water habitats, and supporting nationally important fisheries and protected fauna.

Habitats of Local Importance (Higher Value) occurring within the survey corridor for the authorised UWF Grid Connection include wet grassland (GS4), scrub (WS1), mixed broadleaf woodland (WD1), mixed broadleaf/conifer wood-land (WD2), hedgerows (WL1), and tree lines (WL2). A small area of Oak-birch-holly wood-land (WN1) at Scraggeen was found to correspond to the EU Habitats Directive 92/43/EEC habitat, 'Old sessile oak woods with Ilex and Blechnum, in the British Isles (91A0)', and is therefore evaluated as being of County Importance. A small area of Wet heath/Wet grassland (HH3/GS4) habitat mosaic was found at Loughbrack Townland; wet heath corresponds to EU Habitats Directive 92/43/EEC Annex I habitat 'North-ern Atlantic wet heaths with Erica tetralix (4010)', however as the area of habitat in question was very limited in extent and degraded through grazing and drainage it is considered to be of Local Importance (Higher Value). An area of Lowland blanket bog (PB3) was found at Reardnogy Beg, this habitat corresponds to EU Habitats Directive 92/43/EEC Annex I habitat to 'Blanket bogs (7150)'; however, this area of bog was found to be in poor condition due to evidence of peat harvesting and substantial colonization by invasive Rhododendron. With the exception of 0.05ha of Wet Grassland (GS4) at Mountphilips Substation site, none of the above described habitats are located within the works area and hence will not be directly impacted by the UWF Grid Connection. It is noted that the Mountphilips Substation site is predominantly (1.7ha) Improved Agricultural Grassland (GS1), which is of Local Importance (Lower Value).

Due to the location of sections of the UWF Grid Connection 110kV UGC within an SPA designated for Hen Harrier, a number of habitats along the route of the 110kV UGC support the structure and function of the SPA. This primarily includes foraging habitats in the open landscape (grassland, heath and bog) habitats.

Sensitivity: Terrestrial Habitats are sensitive to direct land take, pollution, and environmental changes resulting from modification such as increased drainage. Groundwater dependant habitats such as bog and peatland habitats may be sensitive to changes in groundwater regimes or changes in ground water quality. The diversity of habitats is particularly sensitive to encroachment from invasive species which may out-compete local native species. Habitats are also sensitive to Human activities such as burning and recreational use.

Trends: The present survey forms a baseline classification of habitats on or near the Whole UWF Project. No previous habitat information at a suitable scale is available from which trends can be identified or changes evaluated. Reporting on trends with regard to protected habitats and species under the EU Habitats Directive is provided to the EU under Article 17 of said directive. Overall trends for some Annex quality habitats present within the receiving environment such as Wet Heath are included therein and evaluated nationally (stable in the case of Wet Heath for example). Availability of trends in respect of locally important habitats is limited (Browne, 2007). We would note that the onsite Wet Heath was subject to cattle grazing at the time of the windfarm EIS (2013), and this is still the case. Likewise, in respect of Upland Blanket Bog, the windfarm EIS has previously identified degradation from peat extraction, land reclamation, conifer planting, grazing and drainage. The latter two

pressures are still present and therefore represent an ongoing trend. This trend is expected to continue the degradation of these particular habitat types regardless of the Whole UWF Project development. As such, a scenario in which the Project does not take place would result in a continuation of current trends relating to habitats within the study area.

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4.4 Hen Harrier

The harriers (genus *Circus)* are all fairly large hawks with long, broad wings, long tails and legs and slim bodies (Watson 1977). The Hen Harrier *Circus cyaneus* is a medium sized, ground nesting bird which is specifically suited to foraging (hunting) at low height over open ground containing preferred prey species. Their long wings and hunting technique does not equip them for hunting in closed woodland. They were once widespread throughout Ireland but by the early 20th century their numbers had been substantially reduced (O'Flynn, 1983).

In Ireland the Hen Harrier is confined largely to heather moorland and young forestry plantations, where they nest on the ground. They are found mainly in Counties Laois, Tipperary, Cork, Clare, Limerick, Galway, Monaghan, Cavan, Leitrim, Donegal and Kerry. The current national breeding population is estimated at 108 - 157 breeding pairs (Ruddock *et al.,* 2016). The most recent estimate of the national wintering population, from Irelands Article 12 submission to the EU, is 269-349 individuals. Wintering birds may comprise native breeding birds but also birds from overseas which visit Ireland during the winter months (Wernham *et al.*, 2002; Etheridge & Summers, 2006).

Ireland holds the most westerly breeding population of Hen Harrier in Europe.

It has been shown in Ireland (Wilson *et al*., 2006) that breeding Hen Harriers avoid areas where less than 30% of the landscape comprises suitable habitats such as bog (used for foraging and nesting), rough pasture (used for foraging) or young forest (used for foraging and nesting).

Studies have also shown that Hen Harrier demonstrate high nest fidelity (faithfulness) and use nest sites on a traditional basis (which may include different birds using sites on an annual or irregular basis over many years (e.g. Amar & Redpath, 2002, Hardey *et al.,* 2014).

The mechanism for the selection of nesting sites by Hen Harrier is not perfectly understood and is thought to relate to micro-climatic and habitat variables (e.g. shelter, aspect, vegetation present at the actual nest location) as well as macro-habitat determinants (larger scale landscape related influences such as showing a preference for open moorland, heath, young conifer etc.) (Redpath *et al*., 1998; Wilson *et al*., 2009).

Hen Harrier foraging habitat preferences during the breeding season are generally biased towards moorland, grassland mosaics and pre-thicket forest habitats which support larger numbers of prey species. Ruddock *et al.*, 2016, reported that Hen Harrier were more frequently recorded foraging over heather moorland (30%), second rotation forest (18.7%), rough grassland (12.4%) and thicket stage forest (12.4%). In a published study of 900 Hen Harrier pellets in Ireland covering winter and breeding seasons, Hen Harriers were found to have a diverse diet, which varies between areas and seasons and includes small mammals, birds, amphibians and reptiles - up to 78% of the diet of Hen Harriers in Ireland was shown to comprise passerine species of birds (Irwin *et al.,* 2012).

Hen Harrier are considered as 'central-place' foragers with most foraging taking place during the breeding season within a 'core range' of 2km from nests (SNH, 2018, Irwin *et al.* ,2012). During the breeding season females hunt closer to nest locations (typically <1km) whereas males hunt further away (Arroyo et al., 2006). In a remote tracking study in the Irish context, the concentration of Hen Harrier hunting behaviour was more than 10 times higher within 1 km of the nest than it was between 2 and 5 km from the nest (Irwin *et al.* 2012).

Hen Harrier wintering grounds are typically lowland sites below 100m. During winter, Hen Harriers gather at communal or solitary roost sites. In Ireland the majority of these roost sites are located in reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse or saltmarsh. Approximately 20% of known roosting sites in Ireland occur within close proximity to core nesting areas. In 2014, approximately 96 confirmed solitary and communal roosts were known in Ireland, and were estimated to support between 219 – 313 individuals (B. O'Donoghue, pers comm cited in NPWS, 2015). Within continental Europe maximum numbers of up to 50 birds

have been recorded at winter roosts, and in the Irish context, up to 10 birds has been documented (Watson, 1977). Winter hunting grounds cover a much wider range and greater variety of habitats than Summer (Watson, 1977).

4.4.1 Upperchurch Windfarm (including the Proposed Larger Turbines & Met Masts amendment)

The Upperchurch Windfarm is located outside the Slievefelim to Silvermines Mountains SPA. See AA 2021 Figure 11: Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Slievefelim to Silvermines Mountain SPA.

With regard to the Upperchurch Windfarm, Hen Harrier were not recorded as breeding within the study area for the 2013 EIS and the habitat was evaluated as 'sub-optimal'.

A desk-top assessment on habitat availability for nesting Hen Harriers within the 2013 Windfarm study area was undertaken from aerial photography interpretation in 2019. A total of 407ha of land were assessed. Of this, 127ha (31.2%) was considered to provide suitable nesting habitat for Hen Harrier.

In respect of foraging habitats, out of the total of 407ha of lands that were assessed (i.e. those lands comprising the 2013 EIS study area), 95ha (23.3%) was considered to provide suitable foraging habitat for Hen Harrier. In addition to these habitats, a total of 10.6km of hedgerows and treelines were also identified which may offer foraging opportunities to Hen Harrier. The relatively low percentage of suitable foraging habitat is considered a limiting factor to this area attracting Hen Harrier and considered in line with the previous evaluation (2013) of the site as 'sub-optimal'. Foraging at low frequency during the summer months has been described in the 2013 EIS.

Similarly, habitats may be utilised for foraging during the winter months, however no suitable winter roost habitat is present.

Hen harrier surveys for the 2013 EIS included a total of ninety (90) hours observation from 3 vantage points for the winter survey and seventy-two (72) hours observation from the same vantage points for the summer bird survey. There was one observation of an adult male hen harrier in January 2010 outside of the site boundary, during the winter vantage point survey and one observation of an adult female hen harrier within the site boundary in June 2011, during the summer bird survey. There was no evidence of hen harriers breeding at the study site in the summer of 2011. It was concluded in the 2013 EIS that the randomness and low number of hen harrier observations during the vantage point surveys in 2010 and 2011 suggested that the windfarm site is used infrequently by hen harriers.

Surveys in the interim period since consent, for both Upperchurch Windfarm (Ecopower Developments, 2015 & 2016) and the nearby consented Milestone windfarm (BES, 2015 & 2017) have also taken place. See Reference Documents 25 of 36 – 2019 UWF Grid Connection AA Reporting, Appendix A6: Hen Harrier Fieldwork & Survey Results and A7: Hen Harrier Surveys at Upperchurch Windfarm. The results of the Upperchurch Windfarm surveys is that Hen Harrier observations have continued to remain low during the breeding season with only 6 observations, in total comprising 467 seconds, recorded during this period. Of this, only one bird was within the authorised Upperchurch Windfarm boundary – in March 2015 where a bird was recorded for 15 seconds. Pre-construction surveys at the nearby Milestone Windfarm provide further insight into Hen Harrier usage of the area. These surveys took place in April, May and June of 2015; and in April and May of 2017, with only three observations of Hen Harriers across two yearly periods of the breeding season when expected activity would be high if Hen Harriers were breeding onsite (at Milestone) or locally. The methods followed were based on the methodology used in the Irish Hen Harrier Survey 2015 (Ruddock *et al*., 2016) to detect breeding territories.

Surveys were conducted in 2019 in April and July, by Inis Environmental Consultants, in line with Best Practice (Scottish Natural Heritage, 2017) utilising 10 vantage points, and overlapping periods of known peaks in Hen Harrier activity, with 3 observations, in total comprising 200 seconds recorded during this period. Of these

observations, two bouts of flight activity by Hen Harrier, in total comprising 44 seconds out of 120 hours of breeding season surveys, were within 500m of an authorised Upperchurch Windfarm turbine location or within the wind farm study area (see See Appendix 2021 A3: Hen Harrier Survey Data 2019 & 2020).

Vantage point surveys were also conducted in 2020 by Inis Environmental Consultants covering the period from April to September inclusive. See Appendix 2021 A3: Hen Harrier Survey Data 2019 & 2020. These surveys were conducted in line with Best Practice (Scottish Natural Heritage, 2017) utilising 10 vantage points, with 6 hours watching at each vantage point each month, resulting in a total survey time of 360hrs. In total 4 observations of hen harrier were recorded, for a total 165 seconds, during the 2020 survey. Of these observations, only one was within 500m of authorised Upperchurch Windfarm Turbine locations or within the 2013 wind farm study area (see Appendix 8.2: Ornithological Surveys at Upperchurch Windfarm 2010 to 2020). The findings of these surveys confirmed that Hen Harrier sightings remained low during all monitoring and surveying periods, with most activity occurring outside of the site boundary. Where Hen Harrier activity did occur within the site, this was typically intermittent and brief and did not correspond with sustained or repeated foraging activity. **The ornithological survey findings demonstrated that Hen Harrier within this SPA are not dependant on habitats within the windfarm site for foraging, hunting or commuting activity.**

See AA 2021 Figure 5a: Hen Harrier Vantage Point Survey Locations in the Upperchurch Windfarm area and AA 2021 Figure 5b: Hen Harrier Vantage Point Survey Locations for Whole UWF Project

Nearest Nests: Nests identified *within the SPA* during studies for the UWF Grid Connection 2019 application, and their respective distance from Upperchurch Windfarm, are presented in the table below. The nearest nest *(within the SPA)* to the Upperchurch Windfarm is Nest H1, which is 5.3km from the windfarm.

Table 4-6: Historical and Recently Active Hen Harrier Nests 2016-2019

Nest	Within SPA	Last Confirmed as active	Distance to Upperchurch Windfarm 2013 study area (km)	Distance to nearest Consented Upperchurch Windfarm Turbine Location (km)
A	Yes	2016	16.9	17.1
B	Yes	2019	15.2	15.5
C	Yes	2019	13.9	14.1
D	Yes	2019	13.0	13.3
E	Yes	2019	11.8	12.1
F	Yes	2019	10.7	11.0
G1	Yes	2019	7.5	7.5
G2	Yes		7.4	7.4
G3	Yes		7.2	7.2
H1	Yes	2019	5.3	5.3
H2	Yes		5.3	5.4
I	Yes	2016	14.5	14.7
J	Yes	2017	13.4	13.7

*****Distances to the Upperchurch Windfarm 2013 study area and nearest Consented Upperchurch Windfarm Turbine locations are provided for completeness.

Ex-*situ* the SPA boundary, the nearest known historical nest location to the authorised Upperchurch Windfarm is that within the townland of Knockalough, located ca. 2.4 km to the south – no confirmed nest has occurred here in recent years (i.e. 2015-2020) however and the last confirmed nesting attempt was in 2014. Previously a nest has been located at Curreeny, ca. 2.7km to the northwest of the authorised Upperchurch Windfarm, and at

Glenough Windfarm, ca.4km to the south of the authorised Upperchurch Windfarm. The Curreeny nesting territory has not been confirmed active since 2014 (Inis Environmental Consultants, unpublished data) and was also inactive in 2019 and in 2020. The Glenough nesting territory (adjacent to the operating Glenough Windfarm) has been active in recent years up to and including 2020. Upperchurch windfarm is outside the core range (2km) for this nest in respect of foraging.

In addition to the 2020 vantage point surveys, hinterland surveys were carried out to establish occupied territories within 2km of the authorised Upperchurch Windfarm turbine locations in April, May and June of 2020. These surveys comprised of searches within the 2km hinterland surrounding the authorised Upperchurch Windfarm site and included vantage point watches covering the nearest known historical Hen Harrier nest locations at Curreeny, Knockalough, Mauherslieve (Coumnagillagh) and at Glenough Windfarm. These surveys included 42 hours of nest site watches at these known past nesting sites, during which a total of 5 observations of Hen Harriers were recorded. All 5 observations, which included behaviour indicative of nesting (one instance of pre-nuptial flight and two food passes) were at the Glenough Windfarm nest site ca. 4km to the south of the authorised Upperchurch Windfarm site. The Glenough nest site, which has also been active in recent years is outside of the 2km core range of Hen Harrier in respect of foraging. There were no observations of Hen harriers during surveys at the Mauherslieve site, located ca. 6km west of the consented Upperchurch Windfarm site; Mauherslieve was recorded as an active Hen Harrier territory in 2019 during surveys for the UWF Grid Connection.

Consideration of the Passage of Time: The makeup of suitable habitat for Hen Harrier in the Upperchurch Windfarm site has not materially changed since 2012/2013, and the frequency of use by Hen Harrier, recorded during the 2012/2013 surveys, is supported by the results of the Upperchurch and Milestone surveys described in respect of recent years – in addition to survey results from 2019, and by 2020 surveys for the current proposal for Proposed Larger Turbines and Met Masts. By reason of distance from likely centres of activity for Hen Harrier (nearest confirmed nests), usage of the Upperchurch Windfarm site has continued to remain low and does not demonstrate any dependency by birds, breeding within the SPA, upon lands outside the SPA where the consented Upperchurch Windfarm is to be located. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this AA Report 2021 and are supported by findings from surveys conducted in the interim and during the breeding seasons 2019 and 2020.

Based on previous assessment of hen harrier activity at the Upperchurch Windfarm site, it can be concluded that the authorised Upperchurch Windfarm site, is generally unsuitable for nesting hen harrier. Surveys for hen harrier undertaken in the years 2012/2013, 2015/2016 and 2019/2020 have consistently shown that this species does not nest within the authorised Upperchurch Windfarm site, and exhibits low usage of the immediate landscape surrounding the site[6] i.e. the hen harrier does not demonstrate dependency by individuals which are either breeding within the SPA, or breeding/foraging upon lands outside the SPA where the consented Upperchurch Windfarm is to be located.

4.4.2 UWF Related Works

The location of UWF Related Works are outside of the SPA, except for one overlap to the north of Haul Route Works HW7 (however HW7 does not require works or vegetation clearance within the SPA boundary). See AA

[6] Appendix 2021 A3 : Hen Harrier Breeding Season Survey Results 2019 and 2020, and Reference Documents 25 or 36 – 2019 UWF Grid Connection AA Reporting, Appendix A6: Hen Harrier Fieldwork & Survey Results and A7: Hen Harrier Surveys at Upperchurch Windfarm

2021 Figure 11: Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Slievefelim to Silvermines Mountain SPA.

Nesting Habitat within 2km of UWF Related Works

A desk-top assessment on habitat availability for nesting Hen Harriers within 2km of the UWF Related Works was undertaken from aerial photography interpretation. A ground-truthing exercise was then undertaken on these data to identify undetermined habitats and check a sample of the aerial photography interpretation.

A total of 5,455ha of lands were assessed within the 2km buffer of the UWF Related Works. Of this, 1,341 (24.6%) was considered to provide suitable nesting habitat for Hen Harrier, with 4,114ha (75.4%) classed as unsuitable.

Foraging Habitat

A similar exercise to the above was also undertaken to determine the extent of foraging habitat within 2km of the UWF Related Works. Habitats identified as suitable for foraging by Hen Harriers within 2km of UWF Related Works were all peatland habitats (including heath), freshwater marsh, wet grassland, mosaic grasslands (including those with rush cover and rough grazings), scrub, dense bracken, pre-thicket forestry (i.e. forests where there the canopy has not closed), clearfell, hedgerows and treelines. Habitats considered unsuitable for foraging included improved agricultural grasslands and dense (closed-canopy) woodland.

Out of the 5,455ha of lands that were evaluated, 2,050 (38%) was considered to provide suitable foraging habitat for Hen Harrier, with 3,405ha (62%) classed as unsuitable.

In addition, to look at the zone of potential disturbance to foraging Hen Harriers, all foraging habitats within 150m of the UWF Related Works (i.e. the Minimum Approach Distance[7] for Hen Harriers) were also examined for their suitability for foraging Hen Harriers. Out of a total of 560ha, 152ha (27%) were classed as suitable foraging habitat for Hen Harrier with 408ha (73%) classed as unsuitable.

Roosting Habitat within 2km of UWF Related Works

In relation to roost sites, suitable roosting habitats (reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse) are not widely available, with very small fragmented patches of habitat located within 2km of UWF Related Works.

Nearest Nesting and Roost Sites

For the current appraisal a further review of desktop information and consultation with local experts, and NPWS has been undertaken. No Hen Harrier nest locations/breeding sites are recorded within 1km of the UWF Related Works element, or within 1km of the consented Upperchurch Windfarm boundary. None are present within a further radius of 2km (the closest nesting attempt in 2019 was 4.8km from the boundary of the UWF Related Works).

The nearest known *historical* nest location to the UWF Related Works is that within the townland of Knockalough, located ca. 2.5 km to the south; no confirmed nest has occurred here in recent years (i.e. 2016-2019) and the last confirmed nesting attempt was in 2014. Previously a nest has been located at Curreeny, to the northwest of UWF Related Works, and at Glenough Windfarm, to the south of UWF Related Works. The Curreeny nesting territory has not been confirmed active since 2014, was not active in 2019.

[7] 150m is the Minimum Approach Distance (MAD) (Livesey et al., 2016) indicated for likely disturbance in respect of Falconiformes (the family of birds with characteristics most similar to Hen Harrier).

The Glenough nesting territory (adjacent to the operating Glenough Windfarm) has been active in recent years up to and including 2019.

Table 4-7 below outlines the distance in kilometers from all identified nests (2016-2019) to UWF Related Works (construction works boundary). Distances are also provided to the Upperchurch Windfarm 2013 Study area and the nearest Consented Upperchurch Windfarm Turbine.

Table 4-7: Historical and Recently Active Hen Harrier Nests 2016-2019

Nest	Within SPA	Last Confirmed as active	Distance to UWF Related Works (CWB) (km)
A	Yes	2016	15.8
B	Yes	2019	14.0
C	Yes	2019	12.9
D	Yes	2019	11.8
E	Yes	2019	10.5
F	Yes	2019	9.3
G1	Yes	2019	6.6
G2	Yes		6.5
G3	Yes		6.3
H1	Yes	2019	4.5
H2	Yes		4.8
I	Yes	2016	13.6
J	Yes	2017	12.7

*****Distances to the Upperchurch Windfarm 2013 study area and nearest Consented Upperchurch Windfarm Turbine locations are provided for completeness.

No Hen Harrier nests are present within 2km of the UWF Related Works boundary, either inside the SPA or outside the SPA.

For the period covered by the current evaluation (2016-2019 inclusive) the closest nest (H1) within the SPA to UWF Related Works is 4.5km to the west of the nearest point of construction works.

Winter Roosts within 2km of UWF Related Works

No communal roosts within 2km of UWF Related Works were identified during 2012 – 2017, or 2017/2018 surveys, or are known to exist in the area based on desktop review, and the results of scoping and consultation with local NPWS/Hen Harrier surveyors.

Connectivity to Designated Sites – Separation distance of UWF Related Works to the SPA

The location of the UWF Related Works are outside of the SPA, except for one overlap to the north of Haul Route Works HW7 (however HW7 does not require works or vegetation clearance within the SPA boundary). Otherwise, the nearest boundary of the SPA is:

- 580m to the west of Internal Windfarm Cabling;
- 173m to the west of Realigned Windfarm roads;
- 157m west of Haul Route Works;
- and 805m west of Telecom Relay Pole.

Connectivity to Designated Sites – Scottish Natural Heritage Guidance

Considering the SNH recommendation that it is the core range (2km) which should be used when determining connectivity, given the limited amount of foraging habitat available for Hen Harrier within 2km of UWF Related Works and, importantly, no known precedent for traditional usage by Hen Harrier, it is considered that nesting pairs within the SPA do not currently rely on hunting habitat within the consented Upperchurch Windfarm or within the construction works area boundaries of the UWF Related Works.

In the period since the submission of the UWF Related Works Appeal to An Bord Pleanála, surveys conducted in April and July 2019 at the UWF Related Works site, in April and July, in line with Best Practice (SNH 2017) and overlapping periods of known peaks in Hen Harrier activity, recorded no flight activity by Hen Harrier within 500m of UWF Related Works.

4.4.3 UWF Grid Connection

4.4.3.1 Context

The UWF Grid Connection comprises the Mountphilips Substation site, which is located to the west of the Slieve Felim & Silvermine Mountains upland area, and the 110kV UGC which is routed from the Mountphilips Substation to the already consented Upperchurch Windfarm (UWF) Substation which is to the east of the upland area. The Mountphilips Substation is not located within the SPA; however, the 110kV UGC, which is 30.5km in length, passes through the boundary of the SPA for 8km in total. Where the 110kV UGC is routed outside of the Mountphilips Substation site (including through the SPA area), the 110kV UGC is entirely located within paved roads. The public road in question, through the boundary of the SPA, is the aforementioned Regional Road R503 which links Thurles to Limerick city.

See AA 2021 Figure 11: Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Slievefelim to Silvermines Mountain SPA.

The landcover of the surrounding upland area is predominately agricultural grassland and commercial forestry, with regional and local roads occurring throughout connecting the towns of Thurles, Nenagh, Cappawhite, Cappamore, Tipperary Town, Newport and Limerick city, in addition to several smaller villages such as Hollyford, Upperchurch, Kilcommon, Rearcross, Murroe, Doon and Silvermines.

This upland area also includes the Slievefelim to Silvermines Mountain Special Protection Area (SPA), which is a European Site designated under the EU Birds Directive (2009/147/EC) of special conservation interest for Hen Harrier.

The Slievefelim to Silvermines Mountain SPA as a whole covers 20,917ha[8], has held between seven (2010) and ten (2015) pairs of nesting Hen Harrier (Ruddock *et al*., 2016), and is considered one of the strongholds for Hen Harrier in the country. The SPA has a high proportion (70%) of suitable habitat, totalling 14,552ha (extrapolated from data in Moran & Wilson-Parr, 2015). Within the SPA, nesting Hen Harriers have shown a preference to nest in the early stages of new and second-rotation conifer plantations, though some pairs may still nest in tall heather of unplanted bogs and heath[9]. Hen Harrier surveys, carried out between 2016 and 2019 for the UWF Grid Connection,

[8] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004165.pdf

[9] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004165.pdf

found that Hen Harriers within the UWF Grid Connection study area all nested within this SPA – no nests were recorded outside of the SPA boundary.

In terms of the authorised UWF Grid Connection, the Mountphilips Substation is not located within the SPA; however, the 110kV UGC, which is 30.5km in length, passes through the boundary of the SPA for 8km in total. Where the 110kV UGC is routed outside of the Mountphilips Substation site (including through the SPA area), the 110kV UGC is entirely located within paved roads. The public road in question, through the boundary of the SPA, is the aforementioned Regional Road R503 which links Thurles to Limerick city. In relation to traffic volumes, while the R503 is not a congested road, there is some variation in traffic usage along the route dependant on proximity to local facilities such as schools, with traffic levels higher nearer to Newport. There are 317 houses and 17 community facilities within 100m of the route of the 110kV UGC.

4.4.3.2 **SPA Connectivity**

Guidance is available from Scottish Natural Heritage (SNH) to assist in establishing levels of connectivity to designated SPA's. Connectivity distances per species included are set out from a literature review that examined ranging behaviour. SNH specifically recommends that "*in most cases the core range should be used when determining whether there is connectivity between the proposal and the qualifying interests*". A core foraging range of 2km from nests sites during breeding is presented for Hen Harrier in this Best Practice Guidance (SNH 2018).

As the authorised UWF Grid Connection passes through the boundary of the SPA for over 8km, connectivity is assumed.

4.4.3.3 Nearest Nesting Sites to UWF Grid Connection

In line with the justification as set out in Best Practice[10], nests within 2km of the authorised UWF Grid Connection have been identified for the current appraisal over a study period spanning 2017-2019 inclusive. However, a precautionary approach has been taken to include the presentation of nest data out to 3km from the authorised UWF Grid Connection – this reflects that in certain instances the central point of observed breeding activity is often variable within a breeding season or inter-annually, and due to this potential for variation, it is considered that this more comprehensive, precautionary approach is required for completeness.

Methods for the current study included a systematic review of desktop information, consultation with local experts and NPWS and fieldwork in line with Best Practice methods. The results of previous Hen Harrier surveys (2016, 2017 to inform the previous 2018 UWF Grid Connection (PL92.301959), and 2019 fieldwork to identify breeding behaviour (in April 2019) and active nests (in June and July 2019) within the study area are presented. For the purpose of this appraisal, all confirmed nests and /or centre points of observed breeding behaviour are considered as nesting attempts, in line with a precautionary approach[11] and established Best Practice in the evaluation of nesting attempts[12]. For the avoidance of doubt, although studies conducted in 2016 and 2017 were

[10] Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind Farms. Version 2. SNH, Battleby.

[11] Not all breeding activity observed potentially becomes a breeding attempt- however a precautionary principle is applied.

[12] Hen Harrier Project, (2019). HARRIER HEN PROGRAMME Terms and Conditions 2nd Edition April 2019. Hen Harrier Project, Oranmore, Co. Galway. Note 6, Pg. 22

in relation to a different 110kV UGC route for the previous 2018 UWF Grid Connection application (PL92.301959) and therefore different study extent, consultation with local experts and NPWS was undertaken in 2019 for the 2019 UWF Grid Connection AA/EIAR preparations to determine whether or not additional nests were known from any areas outside the prior study extent. Results of this consultation was used to scope possible territories requiring survey in 2019 (within 2km of the now authorised route of the 110kV UGC) in line with Best Practice (Hardey *et al.,* 2014) and for which the results are herein presented. Based on information on nest territories in 2016-2018 obtained through consultation, the 2019 study results which confirm the location of these previously identified territories, and the cautionary approach in assigning nest status to any observed breeding activity, data presented herein is considered complete and sufficient to inform the evaluation of likely significant effects.

Hen Harrier nests and/or nesting attempts for the period 2016-2019 and within 3km of the now authorised UWF Grid Connection are shown in Table 4-8. In general terms there are 7 traditional nesting territories within and up to 2km from the authorised UWF Grid Connection (A-G) - with a further 3 traditional territories within 3km (H-J); i.e. 10 traditional territories in total within 3km. Not all of these are occupied in any given year, however, with, for example, only 7 of the 10 territories confirmed as active during the 2019 breeding season.

For the period 2016-2019, 9 nests were recorded within 2km, with a further 3 nests within 3km, and 1 nest at 3.2km from the UWF Grid Connection (13 nests in total), all of which were located on lands within the SPA boundary, (note that nest locations G1, G2 and G3 are considered to be the same occupied territory, as are locations H1 and H2, with slight inter-annual variation in the exact nest location within that territory). Four of the seven active territories identified in 2019 had successful nests (i.e. these were still active in July 2019 having either recently fledged young or with large chick(s) still in the nest at that time).

Table 4-8: Identified Hen Harrier Nests within 3km of the authorised UWF Grid Connection, 2016-2019

Nest	Distance to UWF Grid Connection (km)	Most recent year when active
A	0.6	2016
B	1.0	2019
C	0.9	2019
D	1.5	2019
E	1.8	2019
F	2.0	2019
G1 G2 G3	1.8 2.0 1.9	2019
H1 H2	*2.6* *3.2*	2019
I	*2.4*	2016
J	*2.6*	2017

With regard to proximity to works and therefore exposure to source impact pathways for possibly significant effects, the closest identified nest in any year to the authorised UWF Grid Connection was 0.6km away (breeding territory A in 2016), with the closest active nest (or centre-point of a territory) in 2019 0.9km from the nest (breeding territory C).

No nest occurs closer than 600m to the authorised UWF Grid Connection. No nests were recorded within 2km of the Mountphilips Substation site, with the nearest nest being 4.6km from Mountphilips (Nest A in 2016).

4.4.3.4 Nesting Habitat in the UWF Grid Connection study area

As noted earlier, Hen Harrier are essentially central place foragers, with most foraging taking place during the breeding season within 2km of nests. They are also faithful to traditional nesting sites or territories and regularly nest year after year in the same general location (Hardey *et al.,* 2014). The heretofore identified nests (A-J) are therefore reasonably considered to accurately reflect any short-term nesting or likely nesting territories which may overlap the time period for construction.

Nevertheless, cognisance is being given in the current evaluation to the general availability of nesting habitat, within 2km of the authorised UWF Grid Connection, notwithstanding whether Hen Harrier territories have been recorded within this area. This is to provide contextual information on the general availability of nesting habitats and to allow for evaluation if required of the degree of displacement habitat available for nesting harrier within the study zone stipulated in Guidance.

All habitats within 2km of the authorised UWF Grid Connection (whether within the SPA or outside the SPA) were evaluated for their suitability as nesting habitat for Hen Harrier. Habitats identified as suitable for nesting by Hen Harriers within 2km of the authorised UWF Grid Connection were wet grassland, peatland habitats (including heath), scrub, dense bracken and both pre- and post-thicket forestry (as per Ruddock *et al*., 2016). Habitats considered unsuitable for nesting included agricultural grasslands (including improved grasslands and rough grazing), clearfell, hedgerows and treelines (Ruddock *et al*., 2016).

Of the 8,343ha of lands present within 2km of the authorised UWF Grid Connection, 3,580ha (43%) was considered to provide suitable nesting habitat for Hen Harrier, with 4,763ha (57%) classed as unsuitable. The latter percentage includes all the lands at Mountphilips – there is no suitable nesting habitat at this location.

The availability of suitable habitats within 2km of the authorised UWF Grid Connection therefore exceeds the 30% threshold indicated by Wilson *et al*. (2006) for Hen Harriers to use the landscape.

However, while there is sufficient *nesting* habitat (43%) to support Hen Harrier within 2km of the UWF Grid Connection, at closer distances to the authorised UWF Grid Connection the habitats are considered to be less attractive at least to nesting Hen Harriers - within 50m of the authorised UWF Grid Connection works for example, all habitats (a total of 340ha), only comprised 38ha (11%) as suitable nesting habitat for Hen Harrier. This undoubtedly reflects the location of the route of the 110kV UGC on primarily public road.

The appropriate core foraging range is illustrated on AA Figure 10: Habitat Suitability within the Core Foraging Range of Hen Harrier Nests and AA Figure 11: Habitat Suitability within 2km of UWF Grid Connection (see Reference Document 25 of 36). In line with Best Practice, the background mapping, townlands, geographical context, precise locations of nests are not provided, to protect Hen Harrier.

4.4.3.5 Foraging habitat within the 2km core range of identified nests

The consideration of the availability of suitable *foraging* habitat is required to determine the likelihood of source impact pathways related to disturbance impacting on foraging Hen Harrier, during the breeding season and potentially resulting in reduced breeding success.

Hen Harriers primarily forage within 2km of the nest, and therefore this core range of 2km around identified nests has been selected for further consideration.

Within this radius of nests *breeding* Hen Harrier will be more susceptible to displacement related effects where sources of disturbance occur within 150m of suitable foraging habitat (based on the Minimum Approach Distance

or MAD[13]) A subset therefore of all suitable habitats within 2km of an identified nest location, and which also occur within 150m of authorised works is examined further within the relevant evaluation tables for disturbance in Section 6.9.3.1.

Collectively, the total area of lands suitable for foraging Hen Harrier within 2km of all nests combined comprise 5,413ha or 43% of the total lands within 2km of all identified Hen Harrier nests (12,560ha). Linear features comprising 332km are also present which may offer foraging opportunities.

On an 'individual territory' basis, none of the 10 regularly occupied territories (2019) have less than 33% foraging habitat available (range 33%-54%) within 2km of their individual nest locations (or identified central point of territory).

As noted, at least 30% suitable habitat is required for an area to be attractive to Hen Harrier. Foraging habitat analysis demonstrate that there is foraging habitat greater than this threshold available within the core foraging range comprising a 2km radius of the nests identified, individually (33% - 54%), collectively (43%) and also on a per territory basis.

The appropriate core foraging range is illustrated on AA Figure 10 and AA Figure 11 (see Reference Document 25 of 36)

4.4.3.6 Winter Roosting Habitat in the UWF Grid Connection Study area

In the winter months harriers often roost communally, typically in habitats such as reedbeds and heather less than 100m above sea level (ASL). However, small numbers of communal roosts exist at higher altitudes. Roosts are often traditionally used sites (Clarke & Watson, 1990), and selection of same may not be based on habitat suitability alone, with other factors such as land use change, levels of disturbance, etc. being critical determinants (Clarke & Watson, 1990).

In relation to roost sites, suitable roosting habitats (reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse) are not widely available, with very small fragmented patches of habitat are located within 2km of UWF Grid Connection. Specific roosts are described in Section 4.4.4.7 below - it is considered that these comprise the only roost locations likely to be used with sufficient frequency to be considered in terms of possible source impact pathways.

4.4.3.7 Roosts in the UWF Grid Connection study area

No communal roost was identified within 2km of UWF Grid Connection during 2016-2018 surveys. 1 no. roosts exist at 2.1km from the UWF Grid Connection in Goulmore townland, with 2 further roosts between 3.3km and 3.6km from the UWF Grid Connection (110kV UGC). Based on desktop review, and the results of scoping and consultation with local NPWS/Hen Harrier surveyors no other roosts have been identified**.** There are therefore no known roosts within the likely zone of effect of the authorised UWF Grid Connection.

Based on studies conducted for the previous planning application (PL92 .301959) the roost population of the UWF Grid Connection study area was previously estimated as 0-5 birds (based on a maximum of 5 birds recorded concurrently across all roosts on any given day, from 2 winter seasons of effort). This has the potential to increase

[13] 150m is the Minimum Approach Distance (MAD) (Livesey et al., 2016) indicated for likely disturbance in respect of Falconiformes (the family of birds with characteristics most similar to Hen Harrier).

or decrease dependant on inter-annual variation, weather or other factors. The maximum count of 5 birds at any individual roost (comprising 4 adult males and one female) was only recorded on a single occasion, in January 2018.

Further details on fieldwork and survey results for Hen Harrier is contained in the 2019 UWF Grid C onnection AA Reporting Appendix A6: Hen Harrier Fieldwork & Survey Results and Appendix A7: Hen Harrier Surveys at Upperchurch Windfarm 2015 – 2017 (see Reference Document 25 of 36).

4.4.4 UWF Replacement Forestry

The UWF Replacement Forestry location comprises primarily improved agricultural grassland, which is of low attractiveness for foraging Hen Harrier. No breeding or winter roost habitat is present. The nearest nest to UWF Replacement Forestry is H1 at 6.8km distant.

The UWF Replacement Forestry is located outside of the SPA boundary. See AA 2021 Figure 11: Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Slievefelim to Silvermines Mountain SPA.

4.4.5 UWF Other Activities

The Upperchurch Hen Harrier Scheme is located outside the SPA in Knockcurraghbola Commons, Coumnageeha, Foilnaman, Knockmaroe and Grousehall townlands on agricultural lands between the Slievefelim to Silvermines SPA and the Upperchurch Windfarm, see AA 2021 Figure 11.

Haul Route Activities are also located outside the SPA. By their nature these locations are located on existing public roadways and roadside verges and do not comprise or include foraging or breeding habitat for Hen Harrier. Similarly, habitats are not suitable for foraging during the winter months, and no suitable winter roost habitat is present. Those locations in closest proximity to the already consented Upperchurch Windfarm (HA21-23) whilst unsuitable in themselves they do occur adjacent to lands as part of the Consented Upperchurch Windfarm where foraging at low frequency has been recorded. Similarly Monitoring Activities during the construction of the Whole UWF Project will take place on lands which may be utilized for foraging albeit at low frequency.

Suitable foraging habitat for Hen Harrier is present at Shower Bog and at locations of wet grassland along the route of the overhead line relating to Overhead Line Activities.

4.4.6 Hen Harrier – Importance, Sensitiviy, Trends

4.4.6.1 Importance of Hen Harrier

Hen Harrier is listed on Annex I of the EU Birds Directive 2009/147/EC. In 2007, six Special Protection Areas (including the Slieve Felim to Silvermines Mountains SPA) were designated across the country with breeding populations of Hen Harrier as the sole Special Conservation Interest to ensure the conservation of the species. The breeding population of Hen Harrier is Amber listed on the most recent Birds of Conservation Concern in Ireland 2014 – 2019 (Colhoun and Cummins, 2013). The Slievefelim to Silvermines Mountain SPA is only designated for breeding hen harrier. Both breeding and wintering Hen Harrier present are evaluated as Internationally Important and assigned a sensitivity rating of **Very High** (equivalent to NRA International Importance) for the purpose of evaluation.

4.4.6.2 Sensitivity of Breeding Hen Harrier

Sensitivity to Habitat Loss

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

Sensitivity to disturbance

At the nest

Hen Harriers are known to be sensitive to disturbance at the nest (Masden, 2010, Pearce-Higgins *et al.,* 2012). The effects of significant disturbance to Hen Harrier may be nest desertion, reduced incubation periods (resulting in embryo mortality), or additional stress on adult birds due to their propensity to alarm at intruders. Some or all of these effects may result in longer term abandonment of (traditionally held) nesting areas, with resultant local and/or population level effects.

Whilst raptors in general may accept short infrequent disturbance events proximal to nests, and may even be highly tolerant of certain sources of disturbance, sudden changes during critical periods such as the start of the breeding season may provoke a higher level of response (Petty, 1998) with consequent effects on breeding success and local reproductive rates.

Ruddock and Whitfield, 2007, provides background citations from the grey literature on disturbance to Hen Harriers from construction and human activities (e.g. Brown and Amadon 1968, Newton 1979). In addition, the paper cites further references to buffer zone recommendations within the literature, such as Romin and Muck (1999), who recommended a 500m buffer for Northern Harrier, a species very similar to Hen Harrier, and formerly considered conspecific (i.e. the same species). The expert review of disturbance presented by Ruddock and Whitfield (2007) suggests active disturbance events during the incubation (part of breeding) period for Hen Harrier are, in the view of the majority of experts, likely to occur at <10-500m from a nest.

Hen Harrier, whilst at the nest, are evaluated as potentially sensitive to disturbance from construction related activities (during the breeding season) at distances of 500m or less.

Whilst foraging

There have been no specific studies examining the flight initiation distance (FID) of Hen Harriers to human disturbance. However, 150m is the Minimum Approach Distance (MAD) (Livesey *et al.,* 2016) indicated for likely disturbance in respect of Falconiformes (the family of birds with characteristics most similar to Hen Harrier).

A study on FIDs on Northern Harrier *Circus cyaneus hudsonius* from aircraft suggested a mean FID of 70m (Booms *et al.,* 2010) implying that birds may react to disturbance of similar magnitude (90db) at a distance of 105m. In a wider review of FIDs, Livesey *et al.* (2016) indicated a mean FIDs for Falconiformes of 89.7m (with a Minimum Approach Distance (MAD) 134.5m) (for pedestrian-based disturbance) and 79.7m (MAD 119.5m) (for motorized vehicles). However, birds will be habituated to certain background activities and react less to artificial noise versus the presence of humans.

Collectively, these data would conservatively suggest that the MAD indicated in Livesey *et al.,* 2016 is acceptable to assume for the current appraisal, and therefore it is concluded that foraging Hen Harrier are unlikely to be impacted by disturbance events over 150m away and within this distance only events of similar magnitude to the sources described (e.g. at 90dB) may have any effect. A 150m buffer of the authorised UWF Grid Connection is taken as the zone wherein effective habitat loss may take place following disturbance through noise or visual intrusion, should suitable foraging habitat be present within this radius of works which also overlaps the 2km core foraging range of any given nest location. Breeding Hen Harrier are evaluated as sensitive to disturbance within this distance (150m) from works – given the potential for secondary effects on breeding success.

4.4.6.3 Sensitivity of Roosting Hen Harrier

As a species that disperses widely during the winter from breeding sites (Watson, 1977), Hen Harrier are less restricted to specific foraging areas (i.e. non-breeding birds are not territorial) during the non-breeding season. As a consequence, foraging Hen Harrier are evaluated as less sensitive to disturbance at this time, as any individual encountering sources of disturbance will not be tied to a defined territory, and would have ample displacement habitat available within which to forage in the event of a brief disturbance event.

In relation to disturbance in proximity to winter roosting sites; birds are known to forage extensively from regularly used roosting sites (at least up to 24km see Watson, 1977) (compared to a 2km core range for nesting sites) and, in comparison to during the breeding season show little fidelity[14] both of which reduce sensitivity to disturbance related effects.

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

Positive Sensitivity towards habitat creation or sympathetic management

Hen Harriers are positively sensitive to the creation of or sympathetic management of foraging and nesting habitat within their traditional range (Forrest *et al.,* 2011). Multiple studies exist where Hen Harriers have continued to nest and forage in close proximity to operational wind energy developments where inclusive habitat 'enhancement' was provided (Forrest *et al.,* 2011; Robson, 2011 as cited in NPWS, (draft) 2017[15]).

4.4.6.4 Trends in the Baseline Environment

Four national surveys have been undertaken to assess the conservation status of Hen Harrier in Ireland (Norriss *et al.,* 2002; Barton *et al.,* 2006; Ruddock *et al.,* 2012; Ruddock *et al.,* 2016). The most recent survey recorded 108 to 157 breeding pairs (Ruddock *et al.,* 2016). This was lower than the breeding population estimate for 2010 of 128 to 172 breeding pairs (Ruddock *et al.,* 2012), similar to the estimate of breeding pairs in 2005 of 132 to 153 (Barton *et al.,* 2006) and slightly higher than the results of the first national survey which estimated 102 to 129 breeding pairs (Norriss *et al.,* 2002).

The Slievefelim to Silvermines Mountains SPA was one of only two SPAs to record an increase in breeding territories between 2005 and 2015 (Ruddock *et al*., 2016). It also had the greatest proportional increase in population, with an estimated population of five pairs in the SPA in 2005 rising to a total of ten pairs being estimated in the SPA in 2015. Apart from the Slieve Bloom Mountains SPA, where the Hen Harrier population rose

[14] NPWS.2015. Hen Harrier Conservation and the Forestry Sector in Ireland.
[15] NPWS. 2017. Hen Harrier Conservation and the Renewable Energy Sector in Ireland (Draft).

from five pairs in 2005 to 13 pairs in 2015, the remaining four SPAs designated for the conservation of Hen Harrier all showed reductions in the number of breeding territories recorded from 2005 to 2015 (Ruddock *et al.,* 2016).

Habitat use in the 2015 National Survey of Hen Harrier indicated that second rotation forestry was the most common nesting habitat selected followed by heather. Out of 108 confirmed nesting territories, 64 (59%) were in second rotation forestry with 28 nests (26%) of nests in heather. More scarcely used habitats included scrub (nine nests), first rotation forestry (six nests) and failed forest (one nest).

At a national level, 5-year interval trends show that the Hen Harrier population appears to be in decline, however the population in Slievefelim to Silvermines Mountains SPA is at least stable or on the increase. Changes in the supporting habitat, such as the maturation of 2nd rotation forestry (selected for nesting) or land management changes to further nesting and foraging habitat, are unlikely to produce a declining trend by the time the UWF Grid Connection is under construction. It is assumed in this report that the baseline environment in relation to Hen Harrier, as identified above, will be the receiving environment at the time of construction. Longer term trends have been identified with respect to forestry, such as a declining trend in the amount of (nesting) habitat available within the SPA and are likely to overlap the operation phase. The following is cited directly from the document titled "Hen Harrier Conservation and the Forestry Sector in Ireland", published by NPWS in 2015:

"Forests less than 15 years old constitute to varying degrees a potential foraging resource for Hen Harriers. In line with the forecasted reduction in the extent of the forest nesting resource, indicative future estimates of the extent of the potential forest foraging resource within the SPA network shows an acute declining trend over the next 10 years[16]". This negative trend is also applicable to the Slieve Felim to Silvermines Mountains SPA.

[16] NPWS.2015. Hen Harrier Conservation and the Forestry Sector in Ireland.

4.5 General Birds

4.5.1 Upperchurch Windfarm (including the Proposed Larger Turbines & Met Masts amendment)

Substantial survey effort to identify the bird populations occurring at and surrounding the Upperchurch Windfarm site has been completed between 2010 and 2020. The results of these surveys are relied upon to inform the baseline environment for birds.

Surveys were conducted during the 2010/2011 winter season, 2011 breeding season and 2013 breeding season by Malachy Walsh & Partners Environmental Consultants. Further surveys were conducted by Joe Adamson, independent bird surveyor between March 2015 and April 2017. Inis Environmental Consultants have completed surveys (as part of the UWF Related Works and UWF Grid Connection EIAR preparations) during the 2016/2017 and 2017/2018 winter seasons, and during the 2016, 2017 and 2019 breeding seasons. Breeding season 2020 surveys were also conducted by Inis Environmental Consultants for the current application.

All the species recorded during 2012 – 2020 surveys at the Upperchurch Windfarm site are typical of the habitats present.

General Breeding Birds: Breeding birds recorded at the windfarm site include 37 species in total across 'summer transects' and vantage point surveys. All the species recorded are typical of the habitats present. Species recorded include Skylark, Kestrel, Peregrine Falcon, Stonechat, Crossbill, Raven, Sand Martin and Reed Bunting. Of these is it considered that Peregrine and Sand Martin do not nest on site as there is no suitable nesting habitat present at Upperchurch Windfarm.

General Wintering Birds recorded include a typical assemblage of wintering species. Of these five Amber-listed (Skylark, Hen Harrier, Kestrel, Starling, and Linnet) and 29 Green-listed species were present. In the interest of clarity, we note that the BOCCI status presented herein is the more current Cummins and Colhoun (2013) evaluation, published subsequent to the Upperchurch Windfarm EIS 2013.

Meadow Pipit: This is a very widespread species in Ireland, found in bogs, uplands and areas of scrub and pasture, with an estimated population of 500,000 to 1,000,000 pairs. Birds are ground nesting and typically feed on invertebrates such as crane flies, mayflies and spiders. This species nests on the ground in open countryside in heaths, moors, bogs and coastal marshes. This species is generally site-faithful, although there is some post-breeding dispersal in winter months, particularly from upland areas to lowland habitats.Meadow Pipit is present in suitable habitat, was recorded during all surveys and found to be commonly occurring.

Other Passerines: Amber-listed passerines recorded during 2020 breeding bird surveys include Goldcrest, Greenfinch, House Sparrow, Linnet, Mistle thrush, Robin, Sand martin, Skylark, Swallow, Starling, Stonechat and Willow warbler.

Birds of Prey: Amber-listed Hen Harrier was recorded infrequently during surveys, while Kestrel, also amber-listed, was recorded regularly during the 2019 & 2020 surveys. Green-listed Sparrowhawk and Peregrine were rarely recorded within the windfarm study area. There were two observations of sparrowhawk and one observation of Peregrine falcon during the 2019 VP surveys. These species however were not subsequently recorded during 2020 surveys. Green-listed Buzzard was recorded with moderate frequency during the 2019 & 2020 VP surveys, with 22 observations totalling 2849 seconds (49 mins 29 sec) of flight activity, recorded from 480 hours of VP surveys. Merlin was not observed during studies on Upperchurch Windfarm.

Golden plover were recorded on two occasions in April of 2020 during vantage point surveys, with a flocks of 14 and 7 birds noted on each occasion respectively. These records are likely to represent small flocks of wintering birds, given that there is no suitable breeding habitat within the Windfarm study area, and as no further observations were made during surveys throughout the remainder of the breeding season. No Golden Plover were recorded in the area of the Upperchurch Windfarm during any of the surveys conducted between 2010 and 2019. There is a presence of suitable habitat for wintering Golden Plover in the form of grassland, grassland mosaic, and small areas of bog habitat, at the Upperchurch Windfarm site.

No Red Grouse were recorded in studies on Upperchurch Windfarm. The nearby Slievefelim to Silvermines SPA supports a noteworthy population of Red Grouse (NPWS, 2015), with an estimated 34.8 individuals within the SPA (Cummins et al., 2010). Habitats within the Upperchurch Windfarm site are sub-optimal for Red Grouse; while there are some areas of suitable habitat (heath and bog), these are of limited extent and isolated from the more extensive tracts of heath and bog within the SPA. Existing records for Red Grouse indicate they are absent from the Upperchurch Windfarm site, and this is confirmed by the results of bird surveys carried on the Upperchurch Windfarm site between 2010 and 2020.

No Curlew was observed during studies to inform the Upperchurch Windfarm EIS. Habitats at the Upperchurch Windfarm are either not suitable or sub-optimal for Curlew (open moorland and wet grassland).

Kingfisher was not recorded during studies to inform the Upperchurch Windfarm EIS. Kingfisher are known to occur along tributaries within the Lower River Suir SAC (NPWS, 2013b) as well as within the Lower River Shannon SAC (NPWS, 2013a) which are separated from the nearest proposed larger turbine and met masts by a distance of 3km and 3.1km respectively. While there are exiting records[17] for Kingfisher for both 10km Irish Grid squares within which the Upperchurch Windfarm site is located (R96 and R95) these likely relate to sections of river downstream of the site. Kingfisher favour slow flowing rivers and streams with abundant fish prey items and suitable nesting habitat in the form of vertical sandy banks. The watercourses within and surrounding the Upperchurch windfarm site comprise of small first and second order streams and field drains with no suitable nesting habitat and very limited foraging opportunities.

Consideration of the Passage of Time: The makeup of suitable habitat for general bird species on the Upperchurch Windfarm site has not materially changed since 2012/2013. A review of the survey results between 2010 and 2020 demonstrates that, with the exception of buzzard, there has not been any material change in bird populations within, or within 500m of the windfarm since the initial 2010 surveys. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the evaluations in this 2021 EIAR for the Proposed Larger Turbines and Met Masts.

4.5.2 UWF Related Works

Baseline Context and Character: All the species recorded during surveys for the preparations for the UWF Related Works EIA Report (2018, and revised 2019) are typical of the habitats present.

General Breeding Birds

Given the overlap between Upperchurch Windfarm and UWF Related Works locations we refer to the species described in Section 4.5.1 above for Upperchurch Windfarm.. Studies as part of the 2017/2018/2019 AA Report/EIAR preparations for UWF Related Works, and surveys for UWF Replacement Forestry (which is located

[17] Available at https://maps.biodiversityireland.ie/. *Accessed in December 2020*

in the vicinity) also recorded species such as Blackbird, Goldcrest, Great Tit, Wren and Robin, in addition to Meadow Pipit, Reed Bunting and Skylark. In general, the distribution of general bird species is considered unchanged with respect to the passage of time since the 2013 EIS.

All of the above breed and forage in the receiving environment within suitable habitat. In general, the receiving environment would be quiet with many species unlikely to undergo significant disturbance other than from day to day farming activities, and occasionally forestry operations.

General Wintering Birds

Studies for the 2013 EIS on Upperchurch Windfarm (which overlaps the locations of UWF Related Works) recorded a typical assemblage of wintering species, including the Red-listed Meadow Pipit, and the Amber-listed Skylark, Hen Harrier, Kestrel, Starling, and Linne.. In

Meadow Pipit

There is c.123Ha of suitable habitat, comprising grassland, grassland mosaics, dry heath, upland blanket bog and cutaway bog, for Meadow Pipit within the UWF Related Works study area. It is considered that the habitat at UWF Related Works is sub-optimal/optimal, and it is noted that suitable habitat occurs throughout the wider area. Meadow Pipit were recorded on the UWF Related Works sites during bird surveys for Upperchurch Windfarm and during site surveys for UWF Related Works.

4.5.3 UWF Grid Connection

Baseline Context and Character: The receiving environment in the UWF Grid Connection study area supports a wide variety of general bird species of open countryside and farmland, in addition to more specialist upland species. Some migratory species are only present during the summer or winter months within which they disperse widely over suitable habitat, whilst other sedentary species are present throughout the year.

General Breeding Birds

A standardised bird transect survey was undertaken at the Mountphilips Substation site in the breeding season of 2016 and 2017 and a similar transect methodology was also used to survey whole length of the authorised 110kV UGC route in April 2019 (including again the lands at Mountphilips – covered under Transect T40).

The three breeding season surveys at the Mountphilips substation site recorded a total of 36 species, including one species, Meadow pipit that is Red-listed as a Bird of Conservation Concern in Ireland (BoCCI; Colhoun & Cummins, 2013). A further eleven Amber-listed BoCCI species were recorded (Barn Swallow, Goldcrest, Greenfinch, House Sparrow, Linnet, Mistle Thrush, Robin, Starling and Stonechat). Although breeding status was not confirmed during this survey effort it is likely that all these species could potentially breed within the vicinity of the Mountphilips substation due to the presence of suitable habitats.

In the April 2019 survey along the entire length of the authorised 110kV UGC route, a total of 50 bird species were recorded and although breeding for all species was not confirmed, it is likely that 49 species could possibly be breeding in the vicinity of the route (the exception being a casual record of Lesser Black-backed Gull during surveys – a species which breeds on coasts or large inland waterbodies in Ireland, and were likely to have been recorded on passage through the survey area). During the April 2019 transect survey along the authorised 110kV UGC route, two bird species that are Red-listed as Birds of High Conservation Concern in Ireland (Colhoun & Cummins, 2013) were recorded: Grey Wagtail and Meadow Pipit. In addition, 16 Amber-listed Birds of Conservation Concern in Ireland (Colhoun & Cummins, 2013) were also recorded (Dunnock, Goldcrest, Greenfinch, House Sparrow, Linnet,

Mistle Thrush, Robin, Skylark, Stonechat, Barn Swallow, Sparrowhawk, Sand Martin, House Martin, Kestrel, Lesser Black-backed Gull and Starling).

The species recorded during the surveys at Mountphilips Substation site and along the route of the 110kV UGC are all representative of common and widespread terrestrial breeding bird communities in Ireland, being typical of the mosaic of farmland, woodland and rural gardens found in the survey areas. The full list of species is included in the 2019 AA Reporting for UWF Grid Connection - Appendix A8 General Birds Fieldwork & Survey Results (see Reference Document 25 of 36).

No species on Annex I of the EU Birds Directive were recorded during any of these surveys.

During Hen Harrier vantage point surveys during the non-breeding season 2017/2018 two bird species that are Red-listed as Birds of High Conservation Concern in Ireland (Colhoun & Cummins, 2013) were recorded: Golden Plover and Meadow Pipit. In addition, 3 Amber-listed Birds of Conservation Concern in Ireland (Colhoun & Cummins, 2013) were also recorded (Snipe, Sparrowhawk, and Kestrel).

General Wintering Birds: A repeat of the breeding bird survey at the Mountphilips substation was undertaken in the winters (November-February) of 2016-17 and 2017-18. For these surveys, a total of 25 species were recorded in the vicinity of the Mountphilips substation during transect surveys in the winter of 2016-17 and 2017-18. As with summer, Meadow Pipit was the only BoCCI Red-listed species recorded, along with five BoCCI Amber-listed species (Snipe, Goldcrest, Starling, Robin and House Sparrow). Based on the range of terrestrial habitats mapped and based on observations made during these surveys of the Mountphilips Substation site and the 110kV UGC route, the general wintering bird community is typical of common and widespread bird communities found in the wider countryside in Ireland.

Meadow Pipit: Terrestrial habitat surveys indicate that Meadow Pipit habitat is widespread along the 110kV UGC route. A total of 98 Meadow Pipits were recorded along the 110kV UGC route in April 2019 and breeding in the fields adjacent to the survey transect is therefore likely. A maximum of two birds were recorded in the vicinity of the Mountphilips Substation site in the 2017 breeding season. Meadow Pipit have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation. This species is generally site-faithful, although there is some post-breeding dispersal in winter months, particularly from upland areas to lowland habitats.

Golden Plover breed in heather moors, blanket bogs and acidic grasslands and disperse widely over the winter months. Wintering Golden Plover use wide open expanses of pasture and tilled land. No suitable breeding habitat for Golden Plover was recorded within the survey area, during the survey undertaken in January 2019. However, suitable winter habitat for Golden Plover, consisting of pasture in large open fields was recorded. This species was not observed during ecological surveys in January 2019 or the transect survey in April 2019. Golden Plover have been assigned a sensitivity rating of High for evaluation.

Kingfisher: With regard to the Whole UWF Project, suitable watercourses relate to watercourses along the UWF Grid Conneciton 110kV UGC route. These watercourses were surveyed 300m upstream and downstream of suitable watercourses at crossing locations. These surveyed watercourses include the Newport River (W7), Clare River (W36) and Bilboa River (53) and 23 other watercourses (W5, W8, W9, W18, W21, W22, W23, W26, W28, W29, W30, W33, W35, W39, W41, W42, W46, W47, W48, W49, W50, W51 and W52). Habitats at watercourse crossings are generally unsuitable for nesting Kingfisher, which requires sandy or earth banks alongside the watercourse to establish their tunnel/burrow nests. For the Newport River, the survey area extended to 500m upstream and downstream of the crossing point W7 (NRA, 2008). A Kingfisher nest was found c.540m upstream in a sandy bank. However, suitable Kingfisher habitat was only present from c.400m upstream and further upstream past the nest location. The watercourse downstream from this (i.e. from 400m upstream of the crossing

point to 500m downstream) was typically shallow and fast-flowing with many in-stream boulders and riffles or small waterfalls. These riverine habitats are not utilised by Kingfisher for foraging, which prefer slow-flowing waterways for feeding; (Snow & Perrins, 1998). It is therefore likely that Kingfisher foraging from the nest is from c.400m upstream from the crossing point (W7) and further upstream from this. An Earth bank with Kingfisher nesting potential; but no nest hole present; was noted 430m upstream, a Kingfisher was sighted at 450m upstream and a nest hole was recorded in the riverbank at 540m upstream.

Dippers are a widespread resident along rocky streams and rivers and are slightly smaller than a blackbird. Dippers breed along fast flowing streams and rivers with plenty of exposed rocks. In Ireland, the majority of breeding pairs are found in uplands. A single Dipper was observed during the transect survey in April 2019. Dipper nests were recorded at three water crossing locations; one nest at watercourse crossing W18, two nests at watercourse crossing W28 and one nest at watercourse crossing W41. One other water crossing (W23) was identified as suitable for Dipper; however, no evidence of Dipper was recorded at this location.

Grey Wagtail: During ecological surveys undertaken of the 110kV UGC route in January 2019, observations of evidence of Grey Wagtail at water crossings were recorded and a probable Grey Wagtail nest was recorded at watercourse crossing W36. A total of 11 Grey Wagtail were recorded during the April 2019 transect along the authorised 110kV UGC, and there are suitable habitats for breeding Grey Wagtail at or close by to watercourse crossing locations.

Barn Owl: There are no buildings within the survey area at the Mountphilips Substation site. All buildings within the survey area along the route of the 110kV UGC were evaluated for suitability for Barn Owl during the ecological surveys undertaken in January 2019. The assessment followed criteria according to TII (2017). Four buildings where assessed as having high suitability for Barn Owl. These were all surveyed in August 2019 for occupancy. No signs of occupancy were detected for any of these buildings. One building was too dangerous to enter due to the state of repair. The owner stated that he had occasionally observed Barn Owls during the winter but did not believe that they were breeding at that location.

No suitable breeding habitat for Red Grouse was recorded during the ecological surveys of the authorised UWF Grid Connection in January 2019. In the winter if snow is on the ground the species has a widespread distribution occupying wind swept ridges and lower ground, however no suitable habitat with sufficient habitat cover was recorded within the survey areas and no birds were recorded during any of the ecological surveys in the area.

Curlew:

(Curlew) nest on the ground in a range of habitats in Ireland, from rough pasture, meadows and heather. Huge changes in the upland areas, such as the destruction of peat bogs, afforestation, intensive management of farmland and the abandonment of some lands, leading to encroachment by scrub, gorse and dense rushes, have all affected Curlew breeding habitats. In Ireland, the Curlew is not a common breeder, however it is found in most parts of the country. No suitable habitat for wintering Curlew were recorded during the ecological survey of the authorised 110kV UGC route in January 2019 and no Curlew were observed during any of the other the ecological surveys, including the transect survey along the authorised 110kV UGC route in April 2019. No suitable breeding habitat for Curlew was recorded within the study area during these surveys. In general, grazing regimes and other land management practices within 50m of the road corridor and at the Mountphilips Substation site preclude breeding by this species.

Merlin, Peregrine Falcon: No suitable breeding habitat for Merlin or Peregrine were recorded within the study area during the ecological surveys undertaken in January 2019 (the proximity to the road qualifies the habitats as unsuitable for breeding for Merlin; whilst for Peregrine there are no suitable nesting habitats (large buildings, cliff faces or quarries)). During the winter both species have a widespread distribution, and Merlin may occasionally

perch in roadside trees during the winter months. However, the locations of works do not comprise foraging habitat for these species.

4.5.4 UWF Replacement Forestry

General Birds: Species recorded on the UWF Replacement Forestry site (during habitat surveys) included Meadow Pipit, Wren, Robin, House Martin, Blackbird, Stonechat, Hooded Crow, Chaffinch, Rook, Magpie and Woodpigeon.

4.5.5 UWF Other Activities

General bird species of Hedgerows are present. Resident Bird species described in respect of breeding are likely to be present during the winter months also. Meadow Pipit may be present in suitable fields adjacent to activity locations however habitats such as roadside verges do not comprise breeding habitat.

Bird species present during a site walkover (January 2018) of Overhead Line Activities locations were recorded. In total, twenty-three species were recorded, including six Amber-listed species (Goldcrest, Stonechat, Starling, Common Snipe, Robin and House Sparrow), the remaining species were green listed.

4.5.6 General Birds – Importance, Sensitivity, Trends

General Breeding Birds & Meadow Pipit

Importance: All wild bird species are protected by legislation under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000. Although not listed on either Annex I or II of the EU Birds Directive, due to its importance as a prey item for Hen Harrier in the context of the nearby Slievefelim to Silvermines Mountain SPA, Meadow Pipit have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation.

Sensitivity: General breeding birds are sensitive to habitat loss and disturbance/displacement from noise and/or visual intrusion. Wintering birds are similarly sensitive.

Meadow Pipit are sensitive to changes in land cover or land use which results in a decrease of suitable nesting habitat (improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog), these changes can affect breeding numbers, foraging success, and increased exposure to predation through displacement to less viable feeding areas, and local population level declines.

Bird species are sensitive to suitable landscaping/reinstatement from which positive effects may accrue.

Trends: In trend analyses on General Breeding Birds undertaken on 53 species within the most recent Countryside Bird Survey report (Crowe et al., 2014) some 20 species showed increasing trends over the 16-year period since 1998, while 17 species remained relatively stable.

The most recently published Atlas (Balmer et al., 2013) has shown that the species with the largest winter range are still the Hooded Crow, Wren, Robin and Blackbird. In Ireland the Atlas found that 74% of species had increased their winter range. The abundance and diversity of the bird species within the baseline environment is evaluated as following the general trend of species populations throughout Ireland as described in published literature such as cited above. Given this, a scenario in which the Whole UWF Project does not take place would result in a continuation of current trends relating to general bird species within the study area. It is assumed in this report that the baseline environment in relation to general bird species, as identified above, will be the receiving

environment at the time of construction as no noticeable change is expected to occur within the relatively short time period prior to commencement of construction. Identified longer terms trends, such as declines in breeding Curlew is likely to overlap the operational phase, as are trends in respect of general breeding birds and wintering birds, identified in publications such as the 2013 Atlas.

Golden Plover

Importance: Although listed on Annex I of the EU Birds Directive, due to an unfavourable conservation status in the EU, Golden Plover is provisionally listed as secure at pan-European level. Nevertheless, wintering Golden Plover in Ireland are evaluated as Nationally Important and assigned a sensitivity rating of High.

Sensitivity: Golden Plover are sensitive to changes in land cover or land use of suitable foraging or roosting habitats such as improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog, where land cover/use change may cause reductions in foraging success, increased exposure to predation through displacement to less viable feeding areas, and also reduction in survival rates of wintering birds. Wintering Golden Plover are also sensitive to disturbance or displacement effects due to noise, visual intrusion, and anthropogenic sources.

Kingfisher

Kingfisher are on Annex I of the EU Birds Directive and Amber-listed in Ireland as a species of Conservation Concern (Colhoun & Cummins, 2013).

Importance: Kingfishers are on Annex I of the EU Birds Directive and are Amber listed in Ireland, due to having an unfavourable conservation status in Europe from historical declines. However, Kingfisher populations are not of global concern, thus a sensitivity rating of Low is applied.

Sensitivity: Kingfishers are known be particularly sensitive to disturbance at their nests, although can tolerate disturbance in the vicinity (e.g. on the bank or within the watercourse) provided that the actual nest is not interfered with. Water quality issues, such as nutrification from agricultural run-off or point-source pollution, may also impact on prey availability and water clarity (Kingfishers hunt by observing prey within the water).

Dipper

Importance: Dipper are Green-listed in Ireland, and due to their widespread population in Ireland are assigned a sensitivity rating of Negligible.

Sensitivity: Dipper and other species such as Grey Wagtail which associate with freshwater are sensitive to secondary water quality degradation, including nutrification from agricultural run-off or point source pollution and acidification of the water (which is linked to commercial forestry harvesting operations). These may alter prey assemblages which in turn can impact upon breeding success. Such riverine birds may also be impacted by severe weather events, such as localised flooding (which can wash away nests) or very cold snaps during the winter (which limits prey availability).

Grey Wagtail

Importance: Grey Wagtail are Red-listed in Ireland due to short-term population declines. With a recovering Irish population, and a secure European and global population, a sensitivity rating of Low is applied.

Sensitivity: Dipper and other species such as Grey Wagtail which associate with freshwater are sensitive to secondary water quality degradation, including nutrification from agricultural run-off or point source pollution and acidification of the water (which is linked to commercial forestry harvesting operations). These may alter prey assemblages which in turn can impact upon breeding success. Such riverine birds may also be impacted by severe

weather events, such as localised flooding (which can wash away nests) or very cold snaps during the winter (which limits prey availability).

Barn Owl

Importance: Barn Owl, are Red-listed in Ireland due to short- and long-term population declines. Barn Owl are assigned a sensitivity rating of High.

Sensitivity: Barn Owl are well studied in Ireland and face a number of threats. Loss of nesting sites and prey-rich foraging habitats is likely to be one of the main issues, as well as the ingestion of second-generation rodenticides that such prey may have consumed. These can build up within the tissues of the Barn Owl to lethal levels. Barn Owls are also susceptible to road mortality, particularly from hunting along embankments and verges of motorways and other major roads.

Red Grouse

Importance: Although listed on Annex II of the EU Birds Directive, due to a decline in population across Europe including Ireland. Red Grouse are evaluated as of County Importance and assigned a sensitivity rating of Medium.

Sensitivity: Red Grouse are sensitive to habitat loss and fragmentation from afforestation and agricultural land-use change, including over-grazing. Recreational disturbance may also be an issue in some upland areas, as can unsustainable or illegal hunting. Poor management of heather, including illegal burning and wildfires, and ground predators can negatively impact nesting birds during spring and summer months.

Eurasian Curlew

Importance: Listed on the IUCN (global) Red List of Conservation Concern, as well as the Red List of the Birds of Conservation Concern in Ireland, Eurasian Curlew is evaluated as of National Importance and assigned a sensitivity rating of High.

Sensitivity: Breeding waders such as Eurasian Curlew are sensitive to habitat loss or fragmentation through afforestation, habitat loss from peat extraction, ground based predation, destruction from agricultural machinery and abiotic variables such as flooding.

Merlin, Peregrine Falcon

Importance: Although listed on Annex I of the EU Birds Directive, due to population declines across Europe (including Ireland), Merlin in the density recorded are evaluated as of Local Importance (low value) and assigned a sensitivity rating of Negligible. Although listed on Annex I of the EU Birds Directive, due to historical population declines Peregrine populations are on the increase in Ireland. Given the density recorded here they are evaluated as of Local Importance (low value) and assigned a sensitivity rating of Negligible.

Sensitivity: Merlin are sensitive to habitat loss, particularly the intensification of agriculture in upland areas which may impact on prey-rich foraging habitats. The impact of upland afforestation are less clear, as Merlin have adapted to nest in such forested landscapes, although it seems likely that such landscapes reduce the density and availability of prey. Merlin are also sensitive to disturbance during the breeding season. Peregrine remain sensitive to persecution at breeding sites, with several cases of illegal killing reported annually. They are also susceptible to secondary poisoning through the food chain (although this appears to be less of an issue now since the ban (and reduction in use) of certain chemicals).

Bird species are sensitive to suitable landscaping/reinstatement from which positive effects may accrue.

5 STAGE 1: SCREENING

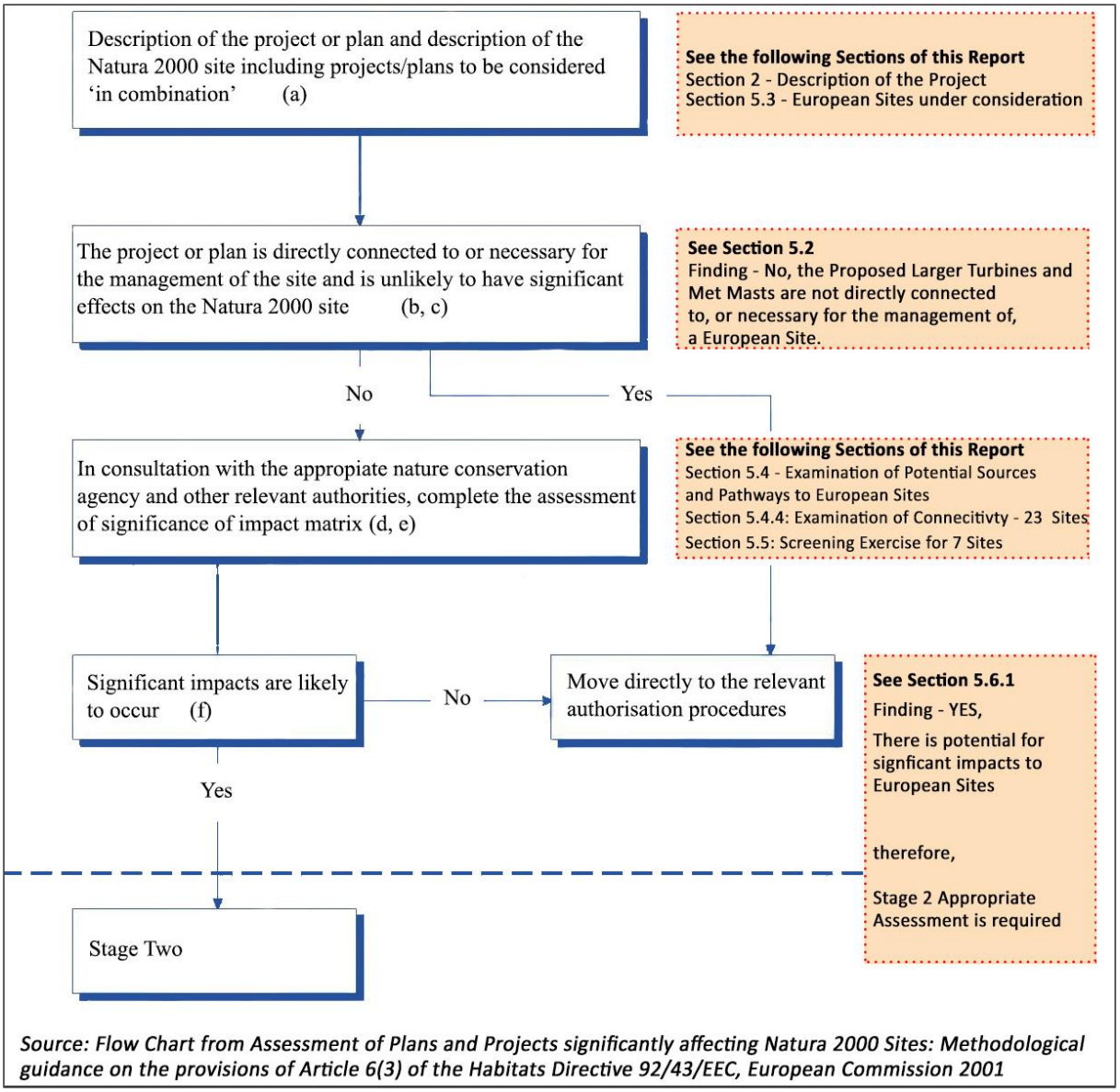
5.1 Screening Evaluation Process

This stage examines the likely effects of a project either alone or in combination with other projects upon a European site and considers whether it can be objectively concluded that these effects will not be significant.

The Screening process comprises four steps, as outlined in the diagram below.

This Screening evaluation examines the effects of the Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm, in addition to the Other Elements of the Whole UWF Project both alone or in combination and considers whether it can be objectively concluded that effects (if any) will be significant or not in relation to European sites.

This screening evaluation takes cognisance of the detailed ecological studies conducted at the site since 2010 that informed the assessment for potential adverse effects to European sites.



Source: Flow Chart from Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) of the Habitats Directive 92/43/EEC, European Commission 2001

5.2 Screening: Is the Project Directly Connected to or Necessary for Management of a European Site?

For a project or plan to be 'directly connected with or necessary to the management of the site', the 'management' component must refer to management measures that are for conservation purposes, and the 'directly' element refers to measures that are solely conceived for the conservation management of a site and not direct or indirect consequences of other activities.

Finding: **NO, neither the Proposed Larger Turbines & Met Masts at the authorised Upperchurch Windfarm nor the Whole UWF Project are directly connected to or necessary for the management of a European Site.**

5.3 European Sites under consideration

Adopting the precautionary principle in identifying potentially affected European sites, it has been decided to include all SACs and SPAs within a 15km radius of the Proposed Larger Turbines and Met Masts at the authorised windfarm. This has been applied around the Proposed Amendment and further is extended to include a 15km area around the Upperchurch Windfarm and around all of the Other Elements of the Whole UWF Project. This includes all river SAC and coastal European sites linked via the river drainage catchments which includes works and activities associated with the Whole UWF Project.

There are 23 European Sites within the extended Study Area - nineteen Special Areas of Conservation (SAC) and four Special Protection Area (SPA for birds). The locations of these European Sites are illustrated in AA 2021 Figure 6: European Sites within 15km of the Whole UWF Project, with the distances from the Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm, and from the nearest Whole UWF Project Element, provided in **Table 5-1.** Those distances presented which are greater than 15km (from the Proposed Amendment) refer to European Sites which come under consideration for cumulative/in combination effects with other elements of the Whole UWF Project.

Table 5-1: Proximity of European Sites to the Proposed Larger Turbines and Met Masts at the Upperchurch Windfarm and to the nearest Element of the Whole UWF Project

	European Site	**Approximate Distance of the European Site from the Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm**	**Approximate Distance of the European Site from the nearest works location associated with any Element of the Whole UWF Project**
1	Slievefelim to Silvermines Mountain SPA (004165)	501m from T21	0m - UWF Grid Connection
2	Lower River Suir SAC (002137)	3km from T6	0m from UWF Other Activities (HA19 location on R503)
3	Lower River Shannon SAC (002165)	3.1km from T17	0m - UWF Grid Connection
4	Anglesey Road SAC (002125)	2.9km from T1	2.5km from UWF Other Activities
5	Bolingbrook Hill SAC (002124)	7.2km from T21	6.3km from UWF Other Activities
6	Keeper Hill SAC (001197)	11.2km from T21	4.3km from UWF Grid Connection
7	Silvermine Mountain SAC (000939)	11.6km from T21	9.4km from UWF Grid Connection
8	Silvermine Mountain West SAC (002258)	12.7km from T21	7.7km from UWF Grid Connection
9	Philipston Marsh SAC (001847)	14.1km from T1	12.0km from UWF Grid Connection
10	Kilduff, Devilsbit Mountain SAC (000934)	13.7km from T16	8.7km from UWF Other Activities
11	Clare Glen SAC (000930)	18.5km from T17	1.6km from UWF Grid Connection

	European Site	**Approximate Distance of the European Site from the Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm**	**Approximate Distance of the European Site from the nearest works location associated with any Element of the Whole UWF Project**
12	Glenstal Wood SAC (001432)	18.6km from T17	2.6km from UWF Grid Connection
13	Slieve Bernagh Bog SAC (002312)	28.6km from T21	9.6km from UWF Other Activities
14	Lough Derg, North-East Shore SAC (002241)	28.7km from T21	12.9km from UWF Other Activities
15	Glenomra Wood SAC (001013)	32.3km from T17	9.1km from UWF Other Activities
16	Tory Hill SAC (000439)	42.2km from T17	10.2km from UWF Other Activities
17	Ratty River Cave SAC (002316)	45.6km from T17	14.8km from UWF Other Activities
18	Askeaton Fen Complex SAC (002279)	50.4km from T17	7.3km from UWF Other Activities
19	Barrigone SAC (000432)	63.4km from T17	3.0km from UWF Other Activities
20	Curraghchase Woods SAC (000174)	52.2km from T17	9.3km from UWF Other Activities
21	Lough Derg (Shannon) SPA (004058)	24.5km from T21	8.1km from UWF Other Activities
22	River Shannon and River Fergus Estuaries SPA (004077)	36.0km from T17	354m from UWF Other Activities
23	Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)	69.0km from T17	5.8km from UWF Other Activities

The Qualifying Interests/Special Conservation Interests and locational context for each of the 23 European Sites examined in this Screening Report are provided in **Table 5-2.**

The Site Synopsis and Conservation Objectives for each site are available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites

5.3.1 Description of European Sites under consideration

A brief description of the 23 no. European Sites within the extended study is provided in Table 5-2 below. The Site Synopsis and Conservation Objectives for each site are available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites

Table 5-2: Description of European Sites within the extended study area

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
1	Slievefelim to Silvermines Mountain SPA (004165)	Hen Harrier (*Circus cyaneus*) (A082)	The SPA is an extensive upland site located in Counties Tipperary and Limerick. Much of the site is over 200m in altitude and rises to 694m at Keeper Hill. Other peaks included in the site are Slieve Felim, Knockstanna, Knockappul, Mother Mountain, Knockteige, Cooneen Hill and Silvermine Mountain. The site consists of a variety of upland habitats, though approximately half is afforested. The remainder of the site is mostly rough grassland that is used for hill farming. Some stands of deciduous woodland also occur, especially within the river valleys. The mix of forestry and open areas provides optimum habitat conditions for Hen harrier. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen Harriers will forage up to c. 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey. The site is also a traditional breeding site for a pair of Peregrine. Merlin has been recorded within the site but further survey is required to determine its status. Red Grouse is found on some of the unplanted areas of bog and heath.	Sourced from *NPWS (2020) Conservation objectives for Slievefelim to Silvermines Mountains SPA [004165]. Generic Version 7.0*. Department of Culture, Heritage and the Gaeltacht. [Version dated 07/04/2020]

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
2	Lower River Suir SAC (002137)	Alluvial Forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* (91E0) *Taxus baccata* woods of the British Isles* (91J0) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330) Mediterranean salt meadows (*Juncetalia maritimi*) (1410) Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260) Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430) Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (91A0) Freshwater Pearl Mussel (*Margaritifera margaritifera*) (1029) White-clawed Crayfish (*Austropotamobius pallipes*) (1092) Sea Lamprey (*Petromyzon marinus*) (1095) Brook Lamprey (*Lampetra planeri*) (1096) River Lamprey (*Lampetra fluviatilis*) (1099) Twaite Shad (*Alosa fallax fallax*) (1103)	This SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary. The Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford. The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. The site also supports populations of several important animal species, some listed on Annex II of the Habitats Directive or listed in the Irish Red Data Book. The presence of two legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the site adds further to the ecological interest and importance.	Sourced from *NPWS (2017) Conservation Objectives: Lower River Suir SAC 002137. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 28/03/2017]

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
		Salmon (*Salmo salar*) (1106) Otter (*Lutra lutra*) (1355)		
3	Lower River Shannon SAC (002165)	Alluvial Forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* (91E0) Coastal Lagoons* (1150) Sandbanks which are slightly covered by sea water all the time (1110) Estuaries (1130) Mudflats and sand flats not covered by seawater at low tide (1140) Large shallow inlets and bays (1160) Reefs (1170) Perennial Vegetation of stony banks (1220) Vegetated sea cliffs of the Atlantic and Baltic coasts (1230) *Salicornia* and other annuals colonizing mud and sand (1310) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330) Mediterranean salt meadows (*Juncetalia maritimi*) (1410) Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260)	This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head. The site encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia. This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.	Sourced from *NPWS (2012) Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. [Version dated 07/08/2012].

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
		Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (6410) Freshwater Pearl Mussel (*Margaritifera margaritifera*)(1029) Atlantic Salmon (*Salmo salar*) (only in fresh water) (1106) Sea Lamprey (*Petromyzon marinus*) (1095) Brook Lamprey (*Lampetra planeri*) (1096) River Lamprey (*Lampetra fluviatilis*) (1099) Bottlenose Dolphin (*Tursiops truncates*) (1349) Otter (*Lutra lutra*) (1355)		
4	Anglesey Road SAC (002125)	Species-rich *Nardus* Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230)	Anglesey Road is a steep-sided valley which extends approximately 1.8 km along the Multeen River to the north of Hollyford village, Co. Tipperary. Anglesey Road is a comparatively small site which contains a range of habitat types and species. It is of particular importance for the good quality examples of species rich, unimproved, upland grassland found.	Sourced from *NPWS (2020) Conservation objectives for Anglesey Road SAC [002125]. Generic Version 7.0.* Department of Culture, Heritage and the Gaeltacht. [Version dated 07/04/2020]
5	Bolingbrook Hill SAC (002124)	Species-rich *Nardus* Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) Northern Atlantic Wet Heath with *Erica tetralix* (4010) European Dry Heaths (4030)	This upland SAC is approximately 6km south-east of Silvermines village in Co. Tipperary. It comprises Bolingbrook Hill and the nearby eastern slopes of Silvermine Mountains in Curryquin and Mucklin townlands. Good quality examples of species-rich, unimproved upland grassland are present within this site.	Sourced from *NPWS (2018) Conservation objectives: Bolingbrook Hill SAC 002124. Version 1.* National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. [Version dated 05/07/2018]

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
6	Keeper Hill SAC (001197)	Blanket Bogs (* if active bog) (7130) Northern Atlantic Wet Heath with *Erica tetralix* (4010)	This SAC is situated between the Silvermines and Slieve Felim Mountains, 13 km south of Nenagh in Co. Tipperaray. Consisting of a steep peak of Old Red Sandstone is notably higher than any of the surrounding upland areas. The site includes the summit and slopes above 250 m which have not yet been afforested. Peregrine Falcon, an Annex I species breeds within the site. Red Grouse occur amongst the tall heather east of the summit	Sourced from *NPWS (2017) Conservation Objectives: Keeper Hill SAC 001197. Version 1.* National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. [Version dated 17/10/2017]
7	Silvermine Mountains SAC (000939)	Species-rich *Nardus* Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) Northern Atlantic Wet Heaths with *Erica tetralix* (4010)	This small site is situated on the northern slopes of the Silvermine Mountains, 1 km south-east of Silvermines village in Co. Tipperary. The geology of the area is sandstone of different ages - older Silurian on the central part of the mountain, while the outer parts are composed of yellowish and red sandstones of Devonian age. The rare Small-white Orchid is also present on site and adds significantly to the value of the site.	Sourced from *NPWS (2018) Conservation objectives: Silvermine Mountains SAC 000939. Version 1.* National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. [Version dated 05/07/2018]
8	Silvermine Mountains West SAC (002258)	Northern Atlantic Wet Heaths with *Erica tetralix* (4010) European Dry Heath (4030) Calaminarian grasslands of the *Violetalia calaminariae* (6130)	This SAC is situated to the north of Keeper Hill, about 10 km south of Nenagh in Co. Tipperary. A ridge composed of Old Red Sandstone is visibly very prominent in the landscape when viewed from the Nenagh to Limerick road. The site is of conservation importance for its heath and grassland vegetation, and as a foraging area for Hen Harrier, and is one of the only extensive unplanted uplands remaining in north Tipperary.	Sourced from *NPWS (2017) Conservation objectives: Silvermines Mountains West SAC 002258. Version 1.* National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. [Version dated 10/11/2017]
9	Philipston Marsh SAC (001847)	Transition mires and quaking bogs (7140)	This site is a small wetland and represents one of only two examples of calcareous fen and mire vegetation in the Mulkear River catchment.	Sourced from *NPWS (2018) Conservation objectives: Philipston Marsh SAC 001847. Version 1.* National Parks and Wildlife Service, Department of Culture, Heritage and

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
				the Gaeltacht. [Version dated 12/01/2018]
10	Kilduff, Devilsbit Mountain SAC (000934)	Species-rich *Nardus* grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) European Dry Heaths (4030)	This upland site is situated approximately 6 km north-west of Templemore in Co. Tipperary. It comprises the summit of Devilsbit Mountain and much of the eastern side of the ridge which extends northwards to Kilduff Mountain. The rare and protected Small-white Orchid is also present on site and adds significantly to the value of the site.	Sourced from *NPWS (2018) Conservation objectives: Kilduff, Devilsbit Mountain SAC 000934. Version 1.* National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. [Version dated 05/07/2018]
11	Clare Glen SAC (000930)	Old sessile oak woods with Ilex and Blechnum in the British Isles (91A0) Killarney Fern (*Trichomanes speciosum*) (1421)	This SAC lies on the Limerick - Tipperary border, in the western foothills of the Slievefelim Mountains, about 10 km north-west of Cappamore. The glen was formed by the action of the Clare River cutting into the Old Red Sandstone. The site comprises the wooded river valley. The woodland, although planted with many exotic trees, is mature and conforms to a type listed on Annex II of the E.U. Habitats Directive. The presence of a number of rare and scarce species including bryophytes and fungi adds further to its importance.	Sourced from *NPWS (2016) Site Synopsis for Clare Glen SAC [000930]. Generic Version 1.* Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 16/05/2018]
12	Glenstal Wood SAC (001432)	Killarney Fern (*Trichomanes speciosum*) (1421)	This SAC lies in the western foothills of the Slievefelim Mountains, about 8 km north-west of Cappamore, Co. Limerick. The glen has been cut into Old Red Sandstone and runs in a north-easterly direction for about 2 km, eventually becoming a steep-sided rocky ravine	Sourced from *NPWS Conservation objectives for Glenstal Wood SAC [001432]. Version 1.* Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 15/05/2018]

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
13	Slieve Bernagh Bog SAC (002312)	Blanket Bogs (* if active bog) (7130) Northern Atlantic Wet Heath with *Erica tetralix* (4010) European Dry Heath (4030)	The Slieve Bernagh Bog is situated to the west of Lough Derg, Co. Clare. The site comprises the Slieve Bernagh mountain range, with the highest peaks at Moylussa (532 m) and Cragnamurragh (526 m), and the surrounding peatlands that flank its northern slopes.	Sourced from *NPWS Conservation Objectives: Slieve Bernagh Bog SAC 002312. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 18/08/2016]
14	Lough Derg, North-East Shore SAC (002241)	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae** (7210) Limestone Pavement* (8240) Alluvial Forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* (91E0) Yew Woodlands *Taxus baccata* woods of the British Isles* (91J0) Alkaline Fens (7230) Juniper Scrub - *Juniperus communis* formations on heaths or calcareous grasslands (5130)	Lough Derg, the lowest order lake on the River Shannon, is one of the largest bodies of freshwater in Ireland. The site includes the northern shore of the lake from the mouth of the Cappagh River in the north-west to just below Black Lough at the north-eastern shore. The greater part of this site lies on Carboniferous limestone.	Sourced from *NPWS (2019) Conservation objectives for Lough Derg, North-east Shore SAC [002241]. Version 1.* Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [[Version dated 24/04/2019)]
15	Glenomra Wood SAC (001013)	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (91A0)	Glenomra Wood is a deciduous semi-natural woodland located in south-east Co. Clare. The dominant tree is Downy Birch (*Betula pubescens*). This is mixed with Sessile Oak (*Quercus petraea*), Ash (*Fraxinus excelsior*) and Beech (*Fagus sylvatica*) throughout.	Sourced from *NPWS (2018) Conservation Objectives: Glenomra Wood SAC [001013]. Version 1.* Department of Culture, Heritage and the Gaeltacht. [Version dated 19/06/2018]

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
16	Tory Hill SAC (000439)	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) (6210) Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae** (7210) Alkaline Fens (7230)	Tory Hill is an isolated, wooded limestone hill situated about 2 km north-east of Croom, Co. Limerick. It is a prime example of a limestone hill set amongst a region of volcanic intrusions. The hill is of geomorphological interest for the end-moraine and for icemarks visible on the solid rock. The site includes Lough Nagirra and its associated wetland vegetation, located to the north and north-east of Tory Hill.	Sourced from *NPWS Conservation objectives for Tory Hill SAC [000439]. Version 1.* Department of Culture, Heritage and the Gaeltacht. [Version dated 03/08/2018]
17	Ratty River Cave SAC (002316)	Caves not open to the public (8310) Lesser Horseshoe Bat (*Rhinolophus hipposideros*) (1303)	This site includes a cave that is an annex I habitat and provides winter hibernation conditions for an internationally important number of Lesser Horseshoe Bat. There is also a summer roost for Lesser Horseshoe bats within this site.	Sourced from *NPWS (2016) Conservation objectives for Ratty Ratty River Cave SAC 002316. Version 1.* Department of Culture, Heritage and the Gaeltacht. [Version dated 30/07/2018]
18	Askeaton Fen Complex SAC (002279)	Calcareous fens with *Cladium mariscus* species of the *Caricion davallianae* * (7210) Alkaline Fens (7230)	Askeaton Fen Complex consists of a number of small fen areas to the east and southeast of Askeaton in Co. Limerick. This area has a number of undulating hills underlain by Lower Carboniferous Limestone. At the base of the hills a series of fens/reedbeds/loughs can be found, often in association with marl or peat deposits. At the south-east of Askeaton, both Cappagh and Ballymorisheen fens are surrounded by large cliff-like rocky limestone outcrops.	Sourced from *NPWS Conservation objectives for Askeaton Fen Complex SAC [002279]. Version 1.* Department of Culture, Heritage and the Gaeltacht. [Version dated 18/05/2018]
19	Barrigone SAC (000432)	Orchid-rich Calcareous Grassland - Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)* (6210) Limestone Pavement* (8240) Juniper Scrub- *Juniperus communis* formations on heaths or calcareous grasslands (5130) (1065) Marsh Fritillary (*Euphydryas aurinia*)	This SAC is situated approximately 5 km west of Askeaton, Co. Limerick. The site comprises an area of dry, species-rich, calcareous grassland. The underlying limestone outcrops occasionally, and the proximity of the site to the Shannon Estuary adds a maritime influence. A range of scrub types are present including Juniper Scrub. A number of factors, including substrate, bedrock, microclimate and maritime influence,	Sourced from *NPWS (2019) Conservation Objectives: Barrigone SAC [000432].* Version 1. Department of Culture, Heritage and the Gaeltacht. [Version dated 15/02/2019]

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
			contribute to the floristic richness at Barrigone. The presence of rare species of plant and invertebrate highlight the site's conservation value.	
20	Curragh-chase Woods SAC (000174)	Alluvial Forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* (91E0) Yew Woodlands *Taxus baccata* woods of the British Isles* (91J0) Lesser Horseshoe Bat *Rhinolophus hipposideros* (1303)	This site is situated approximately 7 km east of Askeaton in Co. Limerick. The area is characterised by glacial drift deposits over Carboniferous limestone. The site consists of mixed woodland and a series of wetlands. The site provides hibernation opportunities and foraging habitat for Lesser Horseshoe bat.	Sourced from *NPWS (2018) Conservation Objectives: Curraghchase Woods SAC [000174]. Version 1*. Department of Culture, Heritage and the Gaeltacht. [Version dated 30/07/2018]
21	Lough Derg (Shannon) SPA (004058)	Cormorant (*Phalacrocorax carbo*) (A017) Tufted Duck (*Aythya fuligula*) (A061) Goldeneye (*Bucephala clangula*) (A067) Common Tern (*Sterna hirundo*) (A193) Wetland and Waterbirds (A999)	Lough Derg lies within counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes. The greater part of the lake lies on Carboniferous limestone while the narrow southern section is underlain by Silurian strata. The site is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In winter, it has nationally important populations of Tufted Duck and Goldeneye. The annex I species Whooper Swan, Greenland White-fronted Goose, Hen Harrier and Common Tern have also been recorded on site.	Sourced from *NPWS Conservation objectives for Lough Derg (Shannon) SPA [004058]. Generic Version 7.0.* Department of Culture, Heritage and the Gaeltacht. [Version dated 07/04/2020]
22	River Shannon and River Fergus Estuaries SPA (004077)	Cormorant (*Phalacrocorax carbo*) (A017) Whooper Swan (*Cygnus cygnus*) (A038) Light-bellied Brent Goose (*Branta bernicla hrota*) (A046) Shelduck (*Tadorna tadorna*) (A048) Wigeon (*Anas penelope*) (A050) Teal (*Anas crecca*) (A052) Pintail (*Anas acuta*) (A054) Shoveler (*Anas clypeata*) (A056)	The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. This site is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species; Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. Furthermore 17 species have wintering populations of national importance. The site holds a nationally important breeding population	Sourced from *NPWS Conservation Objectives: River Shannon and River Fergus Estuaries SPA [004077]. Version 1.0.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. [Version dated 17/09/2012]

	European Site Name and Code	**Qualifying Interest /Special Conservation Interest and Code *denotes a priority habitat**	**Summary Description (from Site Synopsis)**	**Data Source** Last accessed online on 18/02/2021
		Scaup (*Aythya marila*) (A062) Ringed Plover (*Charadrius hiaticula*) (A137) Golden Plover (*Pluvialis apricaria*) (A140) Grey Plover (*Pluvialis squatarola*) (A141) Lapwing (*Vanellus vanellus*) (A142) Knot (*Calidris canutus*) (A143) Dunlin (*Calidris alpina*) (A149) Black-tailed Godwit (*Limosa limosa*) (A156) Bar-tailed Godwit (*Limosa lapponica*) (A157) Curlew (*Numenius arquata*) (A160) Redshank (*Tringa totanus*) (A162) Greenshank (*Tringa nebularia*) (A164) Black-headed Gull (*Chroicocephalus ridibundus*) (A179) Wetland and Waterbirds (A999)	of Cormorant. Three annex I species are listed regularly; Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries.	
23	Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	Hen Harrier (*Circus cyaneus*) (A082)	This is a very large site centred on the borders between the counties of Cork, Kerry and Limerick. The mountains; Knockfeha, Mount Eagle, Knockanefune, Garraunbaun, Taur, Rock Hill, Knockacummer, Mullaghamuish, Knight's Mt, Ballincollig Hill, Beennageeha Mt, Sugar Hill, Knockanimpuba and Knockathea, amongst others are included in this site. Many rivers rise within the site, notably the Blackwater, Owentaraglin, Owenkeal, Glenlara, Feale, Clydagh, Allaghaun, Allow, Oolagh, Galey and Smerlagh. The site is of ornithological importance because it provides nesting and foraging habitat for breeding Hen Harrier. The annex I species Merlin and Short-eared Owl have also been recorded on site.	Sourced from *NPWS Conservation objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]. Generic Version 7.0.* Department of Culture, Heritage and the Gaeltacht. Version dated 07/04/2020]

5.3.2 Consideration of the Passage of Time

During the planning permission process, the Upperchurch Windfarm was subject to Appropriate Assessment, with the latest assessment by An Bord Pleanála in 2014 (prior to grant of permission in August 2014). The subsequent applications for UWF Related Works and UWF Grid Connection were also subject of Appropriate Assessment by An Bord Pleanála, prior to the grants of permission in February 2021. It is also noted that a 2020 application to amend the windfarm substation (granted planning in December 2020) was also subject to a Screening for AA by Tipperary County Council.

The effect of the passage of time between the aforementioned 2014 Appropriate Assessment for the now authorised Upperchurch Windfarm, and this present Appropriate Assessment report for the Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm is considered herein (See **Table 5-3**).

Table Error! No text of specified style in document.**-1: Examination of Qualifying Interests and Special Conservation Interests with regard to the Passage of Time**

	European Site and Code	Qualifying Interest/Special Conservation Interest and Code *denotes a priority habitat	Changes to Conservation Objectives/ Statutory Instrument with regard to the passage of time
1	Slievefelim to Silvermines Mountain SPA (004165)	Hen Harrier (*Circus cyaneus*) (A082)	Conservation Objectives: Updated Generic Version 7.0, dated 07/04/2020 No change to Qualifying Interests No change to Statutory Instrument Status - this Site was officially designated by Statutory Instrument in November 2011.
	Lower River Suir SAC (002137)	Alluvial Forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* (91E0) Yew Woodlands *Taxus baccata* woods of the British Isles* (91J0) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330) Mediterranean salt meadows (*Juncetalia maritimi*) (1410) Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260) Hydrophilous tall herb fringe communities of plains and of the montane (6430) Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (91A0) Freshwater Pearl-Mussel (*Margaritifera margaritifera*) (1029) White-clawed Crayfish (*Austropotamobius pallipes*)(1092) Sea Lamprey (*Petromyzon marinus*) (1095) Brook Lamprey (*Lampetra planeri*) (1096) River Lamprey (*Lampetra fluviatilis*) (1099) Twaite Shad (*Alosa fallax fallax*) (1103)	Conservation Objectives: Updated Version 1, dated 28/03/2017 No change to Qualifying Interests No change to Statutory Instrument Status - No S.I.

	European Site and Code	Qualifying Interest/Special Conservation Interest and Code *denotes a priority habitat	Changes to Conservation Objectives/ Statutory Instrument with regard to the passage of time
		Salmon (*Salmo salar*) (1106) Otter (*Lutra lutra*) (1355)	
3	Lower River Shannon SAC (002165)	Alluvial Forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* (91E0) Coastal Lagoons* (1150) Sandbanks which are slightly covered by sea water all the time (1110) Estuaries (1130) Mudflats and sand flats not covered by seawater at low tide (1140) Large shallow inlets and bays (1160) Reefs (1170) Perennial Vegetation of stony banks (1220) Vegetated sea cliffs of the Atlantic and Baltic coasts (1230) *Salicornia* and other annuals colonizing mud and sand (1310) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330) Mediterranean salt meadows (*Juncetalia maritimi*) (1410) Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260) *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (6410) Annex II Species: Freshwater Pearl-Mussel (*Margaritifera margaritifera*) (1029) Atlantic Salmon (*Salmo salar*) ((only in fresh water) (1106) Sea Lamprey (*Petromyzon marinus*) (1095) Brook Lamprey (*Lampetra planeri*) (1096) River Lamprey (*Lampetra fluviatilis*) (1099) Bottlenose Dolphin (*Tursiops truncates*) (1349) Otter (*Lutra lutra*) (1355)	Conservation Objectives: No updated version, latest version dated 07/08/2012 No change to Qualifying Interests No change to Statutory Instrument Status - No S.I.
4	Anglesey Road SAC (002125)	Species-rich *Nardus* Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230)	Conservation Objectives: Updated Generic Version 7.0, dated 07/04/2020 No change to Qualifying Interests **Change in Statutory Instrument status** – this Site was officially designated by Statutory Instrument in April 2016.

Stage 1: Screening

AA Report 2021

	European Site and Code	Qualifying Interest/Special Conservation Interest and Code *denotes a priority habitat	Changes to Conservation Objectives/ Statutory Instrument with regard to the passage of time
5	Bolingbrook Hill SAC (002124)	Species-rich *Nardus* Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) Northern Atlantic Wet Heath with *Erica tetralix* (4010) European Dry Heaths (4030)	Conservation Objectives: Updated Version 1, dated *05/07/2018* No change to Qualifying Interests **Change in Statutory Instrument status** – this Site was officially designated by Statutory Instrument in April 2017.
6	Keeper Hill SAC (001197)	Blanket Bogs (* if active bog) (7130) Northern Atlantic Wet Heath with *Erica tetralix* (4010)	Conservation Objectives: Updated Version 1, dated 17/10/2017- **Change in Qualifying Interests:** Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) (6230) removed. No change to Statutory Instrument Status - No S.I.
7	Silvermine Mountains SAC (000939)	Species-rich *Nardus* Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) Northern Atlantic Wet Heath with *Erica tetralix* (4010)	Conservation Objectives: Updated Version 1, dated 05/07/2018 This Site was officially designated by Statutory Instrument in April 2017.
8	Silvermine Mountains West SAC (002258)	Northern Atlantic Wet Heath with *Erica tetralix* (4010) European Dry Heath (4030) Calaminarian grasslands of the *Violetalia calaminariae* (6130)	Conservation Objectives: Updated Version 1, dated 10/11/2017 **Change in Qualifying Interests:** Calaminarian grasslands of the *Violetalia calaminariae* (6130) added. **Change in Statutory Instrument status** – this Site was officially designated by Statutory Instrument in April 2017.
9	Philipston Marsh SAC (001847)	Transition mires and quaking bogs (7140)	Conservation Objectives: Updated Version 1, dated 12/01/2018 No change to Qualifying Interests

	European Site and Code	Qualifying Interest/Special Conservation Interest and Code *denotes a priority habitat	Changes to Conservation Objectives/ Statutory Instrument with regard to the passage of time
			Change in Statutory Instrument status – this Site was officially designated by Statutory Instrument in April 2016.
10	Kilduff, Devilsbit Mountain SAC (000934)	Species-rich *Nardus* Grassland on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)* (6230) European Dry Heaths (4030)	Conservation Objectives: Updated Version 1, dated 05/07/2018 No change to Qualifying Interests **Change in Statutory Instrument status** – this Site was officially designated by Statutory Instrument in April 2017.

5.4 Examination of Potential Sources and Pathways for Impacts to European Sites

This Screening for AA considers the effects of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project, on all European Sites; and considers whether it can be objectively concluded that effects (if any) will be significant or not in relation to European Sites.

5.4.1 Conceptual Site Model

The European Sites within the study area were initially screened for connectivity with the Whole UWF Project. Connectivity with a European site was evaluated using a conceptual site model which identifies potential impact source-pathways between the project and the European Sites. The conceptual model (based on source-pathway-receptor connectivity) is a standard tool used in environmental assessment. The model comprises three components:

- A 'source' is defined as the part of the works or activities that has the potential to impact on an European site, its qualifying features or its conservation objectives;
- A 'pathway' is defined as the means or route by which a source can affect the ecological receptor; and
- A 'receptor' is defined as the Special Conservation Interests of Special Protection Areas or Qualifying Interests (QI) of Special Areas of Conservation for which Conservation Objectives have been set for the European Sites being screened.

In order for an effect to be likely, all three components of this mechanism must be in place. The absence or removal of one of the components of the mechanism results in no likelihood for the effect to occur.

5.4.2 Potential Sources and Pathways for Impacts to SAC European Sites

Table 5-4: Potential Sources and Pathways for Impacts to SAC European Sites

Impact Source	Pathway	Impact Description	Potential Impact/Pathway Connectivity
movement of soils and machinery; excavation works; groundworks, use of hydrocarbons & cement-based compounds; works in close proximity to watercourses; instream works; culvert replacement works, parapet works; reinstatement works; maintenance works	soils, surface water, water flowpaths, movement of soils and machinery, direct contact	1: Direct effects to **QI habitat** of an SAC Site: i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity of QI habitat within the SAC	Direct effects to Qualifying Interest habitats within an SAC can only occur if the Whole UWF Project location occurs within the boundary of the SAC and overlaps the extent of the Qualifying Interest habitat
movement of soils and machinery; excavation works; ; groundworks use of hydrocarbons & cement-based compounds; works in close proximity to watercourses; instream works; culvert replacement works; reinstatement works, maintenance works	soils, surface water, water flowpaths, movement of soils and machinery, direct contact	2: Indirect effects to **QI habitat** of an SAC Site via reductions in water quality or the spread of invasive species within the SAC site – 3: Indirect effects to **QI habitat** of an SAC Site via reductions in water quality or the spread of invasive species *ex-situ* the SAC Indirect habitat loss, fragmentation, degradation, loss/reduction in connectivity of QI habitats via reductions in water quality or the spread of invasive species.	2: potential to occur where the Whole UWF Project overlaps the boundary of the SAC and overlaps or occurs in close proximity to the QI habitat within the SAC, potential to occur to any SAC sites within downstream catchments. 3: potential to occur to QI habitats ex-situ an SAC where the Whole UWF Project overlaps or occurs in close proximity to the QI habitat, potential to occur to QI habitats within downstream catchments. 2&3: Invasive species can also be spread downstream or upstream within a catchment, and via machinery/vehicle movements along transport routes, with potential to affect habitats within or ex-situ SAC sites.
excavation works; groundworks, works in close proximity to watercourses; instream works; culvert replacement works; operating	direct contact	4: Direct mortality effects to **QI species** of an SAC Site within or *ex-situ* the SAC	Potential to occur within an SAC where QI species may be present within the SAC boundary and exposed to potential mortality through contact with moving vehicles or active construction works. As there are no instream works within any SAC boundary, there is no potential for direct mortality to aquatic species within their natural location within the designated site, however ex-situ effects require consideration either at locations upstream which are hydrologically connected, or at locations such as bridge crossings where, whilst outside the natural location of animals, some

Stage 1: Screening

AA Report 2021

machinery; reinstatement works, maintenance works,			pathways exist for mortality through contact with operational machinery or traffic. The latter is pertinent only for Otter
instream works; culvert replacement works; parapet works; operating machinery; drilling works; reinstatement works; noise and human disturbance; visual intrusion	direct contact; ground and air vibrations, air, visibility	5: Indirect disturbance / displacement effects to **QI species** of an SAC Site within the SAC Site 7: Indirect disturbance / displacement effects to **QI species** of an SAC Site *ex-situ* the SAC site	Species of Qualifying Interest within an SAC, or supporting species of Qualifying Interests, present within close proximity to Whole UWF Project works have potential to be disturbed/displaced by the works and presence of personnel 7: Species of Qualifying Interest ex-situ to an SAC, or supporting species of Qualifying Interests, present within close proximity to Whole UWF Project works have potential to be disturbed/displaced by the works and/or the presence of personnel
movement of soils and machinery; excavation works; groundworks, use of hydrocarbons & cement-based compounds; instream works; culvert replacement works; reinstatement works, maintenance works,	soils, surface water, water flowpaths, movement of soils and machinery, direct contact	6: Indirect effects to QI species of an SAC Site via habitat loss, fragmentation, degradation, loss/reduction in connectivity of suitable habitat within the SAC site 8: Indirect effects to QI species of an SAC Site via habitat loss, fragmentation, degradation, loss/reduction in connectivity of suitable habitat *ex-situ* the SAC site.	6: Indirect effects to Qualifying Interest species via habitat effects has potential to occur where the Whole UWF Project overlaps the boundary of the SAC and overlaps or occurs in close proximity to the suitable habitat. 8: Indirect effects to Qualifying Interest species via habitat effects has potential to occur where the Whole UWF Project occurs outside the boundary of the SAC but in close proximity to the Qualifying Interest Species' habitat or where the project occurs hydrologically upstream of an SAC. 6 & 8:Invasive species can also be spread downstream or upstream within a catchment, and via machinery/vehicle movements along transport routes, with potential to affect the habitat of Qualifying Interest species within an SAC site

Relevant Development Stages: The Whole UWF Project is screened for potential to affect European Sites during all stages of its development – i.e. construction stage, operational stage and decommissioning stage.

Other Projects considered for their potential to cause in-combination effects to SAC sites: There is potential for other projects cause effects to SAC Sites in-combination with the Whole UWF Project, where other projects occur within the same catchments as the Whole UWF Projects, or within the zone of in-combination effects. These other projects are:

- existing Rearcross Quarry; and forestry, agricultural and turf-cutting activities.
- While no overlap of construction stage with the Upperchurch projects expected to occur, the following other unrelated projects are included on precautionary basis: two permitted but not yet build Milestone Windfarm turbines; consented Castlewaller Windfarm and *potential* grid connection; and the *potential* Bunkimalta Windfarm and consented grid connection. See Appendix 2021 A2 Scoping of Other Projects and Activities

5.4.3 Potential Sources and Pathways for Impacts to SPA European Sites

Table 5-5: Potential Sources and Pathways for Impacts to SPA Sites

Impact Source	Pathway	Impact Description	Potential Impact/Pathway Connectivity
noise and visual intrusion; operating machinery; presence of construction personnel; Wind turbine and met mast structures	contact, visibility, air	1: Direct disturbance or mortality effects to SCI species within an SPA	Direct effects via disturbance have potential to occur within an SPA where SCI bird species may be present in close proximity to project works, activities or personnel occurring within or in close proximity to the SPA. Direct effects via mortality has potential to occur within an SPA where SCI bird species may be present within the SPA boundary and exposed to potential mortality through contact with moving machinery and earthworks within the SPA. Mortality due to collision with moving vehicles (road haulage) is considered extremely unlikely with no precedent in the literature for this resulting in population level/significant effects, therefore this impact pathway (mortality due to collision with moving vehicles) is screened out. There is no potential for mortality due to collision with wind turbines as the Upperchurch Windfarm is located entirely outside of the SPA.
Land cover change, vegetation clearance, noise and visual intrusion; operating machinery; presence of construction personnel, earthworks, movement of material	land cover, visibility, air, surface water flowpaths, watercourses	2: Indirect effects to SCI species within an SPA Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species	Indirect effects to SCI species via habitat effects through physical land cover change, habitat degradation or through disturbance or displacement) has potential to occur where Whole UWF Project works overlaps or occurs in close proximity to suitable (positively selected) nesting, roosting or foraging habitat for SCI Species or their prey items within an SPA. Habitat loss of Prey Item Species nesting or foraging habitat within an SPA has potential to reduce Prey Item species numbers and causing secondary effects to foraging SCIs, where these Prey Item Species occur within any positively selected foraging habitat of the SCI.
Land cover change, vegetation clearance, earthworks, use of machinery; movement of material	land cover, visibility, air, surface water flowpaths, watercourses	3:Indirect effects to Special Conservation Interest Species ***ex-situ*** an SPA Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, or through a reductions in prey item species of SCI species, outside their respective SPA.	Habitat loss of suitable (positively selected) nesting or foraging habitat ex-situ to an SPA may reduce species numbers within an SPA through reduced nest success (in respect of a reduction in utilised foraging habitat) or reductions in supporting source populations outside the SPA. Habitat loss or degradation may reduce the availability of prey items for SCI species where SCI species foraging overlaps suitable habitat outside but not included in the SPA. Indirect habitat effects to SCI species via reductions in water quality has potential to occur within SPA downstream of catchments associated with the Whole UWF Project. Habitat effects via the spread of invasive species has potential to occur downstream or upstream within a catchment, and via machinery/vehicle movements along transport routes.

noise and visual intrusion; operating machinery; presence of construction personnel, earthworks, operating turbines.		4:Indirect effects to Special Conservation Interest Species ***ex-situ*** an SPA Disturbance or mortality effects to Special Conservation Interest bird species outside their respective SPA	Disturbance effects to SCI species (such as when foraging or on migration) outside SPA's may affect in turn breeding success or general survival rates for these species once within SPA Sites. Indirect effects via mortality of SCI species outside of an SPA could occur where works/ground clearance associated with the Whole UWF Project occurs in suitable nesting, roosting or foraging habitat. Indirect effects via mortality of SCI species outside of an SPA could occur inadvertently through contact with the operational wind turbines. Mortality due to collision with moving vehicles (road haulage) is considered extremely unlikely with no precedent in the literature for this resulting in population level/significant effects, therefore this impact pathway (mortality due to collision with moving vehicles) is screened out.

Relevant Development Stages: The Whole UWF Project is screened for potential to affect European Sites during all stages of its development – i.e. construction stage, operational stage and decommissioning stage.

Other Projects considered for their potential to cause in-combination effects to SPA sites: There is potential for other projects cause effects to SPA Sites in-combination with the Whole UWF Project, where other projects occur within the same catchments as the Whole UWF Projects, or within the zone of in-combination effects. These other projects are:

- existing Rearcross Quarry; existing Milestone Windfarm(including the two permitted but not built turbines), and forestry, agricultural and turf-cutting activities.
- While no overlap of construction works or timing with the Whole UWF Project is expected to occur, the following other unrelated projects are included on a precautionary basis: consented Castlewaller Windfarm and potential grid connection; and the potential Bunkimalta Windfarm and consented grid connection.

See Appendix 2021 A2 Scoping of Other Projects and Activities

5.4.4 Examination of Connectivity to 23 European Sites

The connectivity of the proposal to the European Sites within the extended study are (i.e. 15km from all Elements of the Whole UWF Project), is examined in Section 5.4.4.1 (SACs) and Section 5.4.4.2 (SPAs) below.

Relevant Figure:

AA 2021 Figure 6: European Sites within 15km of the Whole UWF Project,

AA 2021 Figure 7: Hydrological Connectivity of the Whole UWF Project to European Sites.

The following impact pathways for the 19 SAC sites are evaluated for connectivity herein:

SAC Pathway 1: Direct effects to **QI habitats** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within the SAC**

SAC Pathway 2: Indirect Effects to **QI habitats** of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **within the SAC**

SAC Pathway 3: Indirect Effects to **QI habitats**, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ***ex-situ*** the SAC

SAC Pathway 4: Direct effects to **QI species** of an SAC Site (i.e. mortality) **within or *ex-situ*** the SAC

SAC Pathway 5: Indirect effects to **QI species** of an SAC Site (i.e. disturbance /displacement) **within** the SAC

SAC Pathway 6: Indirect effects to **QI species** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within** the SAC

SAC Pathway 7: Indirect effects to **QI species** of the SAC Site (i.e. disturbance /displacement) ***ex-situ*** the SAC

SAC Pathway 8: Indirect effects to **QI species** of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ***ex-situ*** the SAC.

The following impact/pathways for the 4 SPA sites are evaluated during the screening exercise:

SPA Pathway 1: Direct disturbance or mortality effects to **SCI species within an SPA**

SPA Pathway 2: Indirect effects to **SCI species within an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species)

SPA Pathway 3: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, or through a reductions in prey item species outside their respective SPA).

SPA Pathway 4: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. disturbance or mortality effects to SCI species outside their respective SPA).

5.4.4.1 Examination of Connectivity to SAC Sites

Table 5-6: Examination of the Connectivity of the Whole UWF Project to SAC European Sites within 15km

European Site (Receptor)	**Separation Distance to nearest Elements of the Whole UWF Project**	**Examination of Potential Impact/Pathway Connectivity to SAC Sites** SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.
Lower River Suir SAC (002137)	0m UWF.OA	**YES – Potential for Connectivity**, due to proximity and/or hydrological connectivity, there is potential connectivity with some or all Elements of the Whole UWF Project to these SAC sites – see Screening Exercises for each of these three SAC Sites in Section 5.5.1 to Section 5.5.3.
Lower River Shannon SAC (002165)	0m UWF.GC	
Clare Glen SAC (000930)	1.6km UWF.GC	
Anglesey Road SAC (002125)	2.5km UWF.OA	**NO CONNECTIVITY** • Neither the Proposed Larger Turbines and Met Masts amendment nor any Element of the Whole UWF Project are located within the boundary of the SAC. Therefore, the Whole UWF Project has **no potential for effects via SAC Pathway 1** • Neither the Proposed Larger Turbines and Met Masts amendment nor any Element of the Whole UWF Project is hydrologically connected to the SAC, nor located in close proximity to the SAC, nor do any transport routes for construction materials pass through or close to the SAC, and therefore the Whole UWF Project has **no potential for effects via SAC Pathway 2 or SAC Pathway 3** • All Qualifying Interests of these SAC Sites are either habitats or plant species, there are *no animal species are listed as Qualifying Interests*, therefore the Whole UWF Project has **no potential for effects via SAC Pathway 4, SAC Pathway 5, SAC Pathway 6, SAC Pathway 7 or SAC Pathway 8**, which all relate to impact pathway connectivity to animal species of Qualifying Interest of an SAC. As stated above there are *no animal species are listed as Qualifying Interests* for any of these ten SAC sites.
Silvermine Mountain West SAC (002258)	7.7km UWF.GC	
Philipston Marsh SAC (001847)	12.0km UWF.GC	
Kilduff, Devilsbit Mountain SAC (000934)	8.7km UWF.GC	
Glenstal Wood SAC (001432)	2.8km UWF.GC	
Slieve Bernagh Bog SAC (002312)	9.6km UWF.OA	
Lough Derg, North-East Shore SAC (002241)	12.9km UWF.OA	
Glenomra Wood SAC (001013)	9.1km UWF.OA	
Tory Hill SAC (000439)	10.2km UWF.OA	
Askeaton Fen Complex SAC (002279)	7.3km UWF.OA	
Bolingbrook Hill SAC (002124)	6.3km UWF.OA	**NO CONNECTIVITY**

European Site (Receptor)	**Separation Distance to nearest Elements of the Whole UWF Project**	**Examination of Potential Impact/Pathway Connectivity to SAC Sites** SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.
Keeper Hill SAC (001197)	4.3km UWF.GC	• Neither the Proposed Larger Turbines and Met Masts amendment nor any Element of the Whole UWF Project are located within the boundary of the SAC and therefore the Whole UWF Project has **no potential for effects via SAC Pathway 1** • While these SACs are located within the Lower Shannon & Mulkear River hydrometric area, neither the Proposed Larger Turbines and Met Masts amendment nor any Element of the Whole UWF Project are hydrologically connected to the SAC *(each of these SAC sites are located upstream in the Newport River catchment)*, nor located in close proximity to the SAC, nor do any transport routes for construction materials pass through or close to the SAC, and therefore the Whole UWF Project has **no potential for effects via SAC Pathway 2 or SAC Pathway 3**; • All Qualifying Interests of these SAC Sites are either habitats or plant species, there are *no animal species are listed as Qualifying Interests*, therefore the Whole UWF Project has **no potential for effects via SAC Pathway 4, SAC Pathway 5, SAC Pathway 6, SAC Pathway 7 or SAC Pathway 8**, which all relate to impact pathway connectivity to animal species of Qualifying Interest of an SAC. As stated above there are *no animal species are listed as Qualifying Interests* for any of these three SAC sites.
Silvermine Mountain SAC (000939)	9.4km UWF.GC	
Ratty River Cave SAC (002316)	14.8km UWF.OA	• Neither the Proposed Larger Turbines and Met Masts amendment nor any Element of the Whole UWF Project are located within the boundary of the SAC and therefore has **no potential for effects via SAC Pathway 1**, and for the same reasons the proposed amendment and the Whole UWF Project have **no potential for effects via SAC Pathway 4**, i.e. mortality of Lesser Horseshoe Bat within Ratty River Cave SAC or within Curraghchase Woods SAC, or mortality of Marsh Fritillary butterfly within Barrigone SAC; • Neither the Proposed Larger Turbines and Met Masts amendment nor any Element of the Whole UWF Project are hydrologically connected to the SAC nor is the Whole UWF Project located in close proximity to the SAC, nor do any transport routes for construction materials pass through or close to the SAC, and therefore the Whole UWF Project has **no potential for effects via SAC Pathway 2 or SAC Pathway 3** • Neither the Proposed Larger Turbines and Met Masts amendment nor any Element of the Whole UWF Project are located within the boundary of the SAC nor is the Whole UWF Project located in close proximity, and therefore the Whole UWF Project has **no potential for effects via SAC Pathway 5 or SAC Pathway 6, SAC pathway 7, or SAC pathway 8**
Curraghchase Woods SAC (000174)	9.3km UWF.OA	
Barrigone SAC (000432)	3.0km UWF.OA	

5.4.4.2 Examination of Connectivity to SPA Sites

Table 5-7: Examination of the Connectivity of the Whole UWF Project to SPA European Sites within 15km

European Site (Receptor)	**Separation Distance**	**Examination of Source/Pathway Connectivity - SPA Sites** SPA Pathway 1: Direct disturbance or mortality effects to SCI species within an SPA SPA Pathway 2: Indirect effects to SCI species within an SPA (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species) SPA Pathway 3: Indirect effects to SCI species ex-situ an SPA (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, via reductions in prey item species SPA Pathway 4: Indirect effects to SCI species ex-situ an SPA (i.e. disturbance or mortality effects to SCI species outside their respective SPA).).
Slievefelim to Silvermines Mountain SPA (004165)	Nearest works: 0m UWF.GC Nearest turbine: 501m (UWF T17)	**YES – Potential for Connectivity**, due to proximity with this SPA site for **SPA Pathway 1, 2, 3, 4** – see Section 5.5.4 Screening Exercise for the Slievefelim to Silvermines Mountain SPA.
Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)	Nearest works: 5.8km UWF.OA Nearest turbine: 69.0km (UWF T17)	**NO CONNECTIVITY – SPA Pathway 1, 2 or 3** • Neither the Proposed Larger Turbines and Met Masts amendment nor any Element of the Whole UWF Project is located within the boundary of any of these three SPAs and therefore the Whole UWF Project has **no potential for effects via SPA Pathway 1**. • Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA and Lough Derg (Shannon) SPA: The Whole UWF Project (including the proposed amendment) is not located within, or in close proximity to either the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA, or the Lough Derg (Shannon) SPA. Nor is the Whole UWF Project hydrologically connected to these SPAs, nor do any transport routes for construction materials pass through or close to either of these two SPAs, and therefore due to separation distance and absence of hydrological connectivity, it is evaluated that the Whole UWF Project has **no potential to cause SPA Pathway 2 or SPA Pathway 3.** • River Shannon and River Fergus Estuaries SPA: While there is hydrological connectivity of the River Shannon and River Fergus Estuaries SPA with the project location, the large downstream distance and dilution factors preclude any downstream effects, in addition no transport routes for construction materials pass through or close to this SPA, and therefore due to separation distance, the large downstream distance and the dilution factor, it is evaluated that the Whole UWF Project has **no potential for effects along SPA Pathway 2 or SPA Pathway 3**.
Lough Derg (Shannon) SPA (004058)	Nearest works: 8.1km UWF.OA Nearest turbine: 24.5km (UWF T21)	
River Shannon and River Fergus Estuaries SPA (004077)	Nearest works: 354m UWF.OA Nearest turbine: 36.0km (UWF T17)	• **YES – Potential for Connectivity for SPA Pathway 4**, due to potential for movement of SCI bird species through Whole UWF Project locations, including the Proposed Larger Turbine locations – see Screening Exercises in Section 5.5.5 to Section 5.5.7.

5.4.4.3 Summary of European Sites with no potential for connectivity to the Proposed Larger Turbines & Met Masts or to any Element of the Whole UWF Project

SAC European Sites: Following the examination of potential connectivity to SAC sites using Conceptual Site Models above, the Lower River Suir SAC, Lower River Shannon SAC and Clare Glen SAC are included in the Screening Exercise in Section 5.5 as there is potential impact pathway connectivity.

The remaining SAC European Sites do not have connectivity to the Whole UWF Project and are considered to be outside the zone of influence:

- Anglesey Road SAC (002125)
- Silvermine Mountain West SAC (002258)
- Philipston Marsh SAC (001847)
- Kilduff, Devilsbit Mountain SAC (000934)
- Glenstal Wood SAC (001432)
- Slieve Bernagh Bog SAC (002312)
- Lough Derg, North-East Shore SAC (002241)
- Glenomra Wood SAC (001013)
- Tory Hill SAC (000439)
- Askeaton Fen Complex SAC (002279)
- Bolingbrook Hill SAC (002124)
- Keeper Hill SAC (001197)
- Silvermine Mountain SAC (000939)
- Ratty River Cave SAC (002316)
- Curraghchase Woods SAC (000174)
- Barrigone SAC (000432)

Consequently it can be objectively concluded that the Whole UWF Project (including the Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm), will not cause significant effects to these European Sites (listed above), either alone or in combination with other projects and activities. Therefore, these European Sites are screened out from further consideration herein.

SPA European Sites: Following the examination of potential connectivity to SPA sites using Conceptual Site Models above, the Slievefelim to Silvermines Mountain SPA is included in the Screening Exercise in Section 5.5 as there is *potential* impact pathway connectivity via SPA Pathways 1, 2, 3 and 4.

The remaining three SPA Sites only have *potential* connectivity via SPA Pathway 4, and this impact pathway is included in the Screening Exercise in Section 5.5. As these SPA Sites do not have connectivity to the Whole UWF Project for SPA Pathways 1, 2 and 3, these impact pathways are screened out.

5.5 Screening of 7 European Sites with potential for connectivity

As described in Section 5.3, 23 European Sites were identified within 15km of the Whole UWF Project including the Proposed Larger Turbines & Met Masts amendment (and including the construction materials and turbine component/abnormal load haulage routes associated with the Project).

As described in Section 5.4, an examination of connectivity pathways between the project and these Sites found that 16 of the 23 European Sites were considered to be outside the zone of influence and are screened out from further evaluation. The remaining 7 European Sites are the subject of a screening exercise in Sections 5.5.1 to 5.5.7 below. These Sites are:

- Lower River Suir SAC (002137)
- Lower River Shannon SAC (002165)
- Clare Glen SAC (000930)
- Slievefelim to Silvermines Mountain SPA (004165)
- Lough Derg (Shannon) SPA (004058) (*SPA Pathway 4 only)*
- Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161) *(SPA Pathway 4 only)*
- River Shannon and River Fergus Estuaries SPA (004077) *(SPA Pathway 4 only)*

The screening exercises establish whether or not impact pathways or interactions exist between the Whole UWF Project and the Qualifying Interests or Special Conservation Interests of the European Sites, and examine whether it can be objectively concluded that these changed effects will not be significant

Consideration of Multi-Year Bird Surveys

An important consideration in the overall screening appraisal for all SPA's are the findings of the multi-year bird surveys conducted for Upperchurch Windfarm and other elements of the Whole UWF Project, particularly UWF Grid Connection. Based on the baseline multiyear vantage point and other surveys conducted (breeding and wintering -2010 (WF site); breeding – 2011 (WF site); wintering 2012/ 2013 (WF site); breeding –2013 (WF site); breeding – 2015 (WF site); breeding (GC site) 2016/2017 and 2019 and wintering (GC site) 2016/2017, 2018; and breeding 2019 and 2020 (WF site)); the site is characterised by very low flight activity by SCI bird species of SPA sites. The relevant survey methods and results are detailed in Appendix 2021 A3: Hen Harrier Survey Data, Upperchurch Windfarm 2019 – 2020, and in Reference Document 25 of 36– AA Report 2019 UWF Grid Connection Appendix A6: Hen Harrier Fieldwork & Survey Results and Appendix A7: Hen Harrier Surveys at Upperchurch Windfarm 2015 – 2017.

Note on the Application of Protection Measures in the Screening Evaluation

The range of construction and operational phase mitigation measures for the authorised Upperchurch Windfarm as set out in the Revised Natura Impact Statement (2013), Construction Environmental Management Plan (2013) and Ecological Management Plan (2013) are not included at the Screening stage of the AA process. Similarly, the herein Screening for AA does not take account of any additional protective measures which may be required or prescribed for the **proposed larger turbines and met masts** to avoid or reduce harmful effects on designated European Sites.

Additionally, the mitigation and monitoring measures which are outlined in the Upperchurch Windfarm Environmental Management Plan 2021 (Updated to Include the Proposed Larger Turbines & Met Masts), which accompanies this Appropriate Assessment (AA) Report (2021) (Stage 2), are not taken into account in the herein Screening for AA

The mitigation measures for the UWF Related Works, UWF Grid Connection and UWF Replacement Forestry Element as set out in the Appropriate Assessment Reporting (2019, 2019 and 2018 respectively) and accompanying Environmental Management Plans are not included at the Screening stage of the AA process.

5.5.1 Screening Exercise for the Lower River Suir SAC (002137)

Lower River Suir SAC consists of the **freshwater stretches of the River Suir immediately south of Thurles**, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, **and many tributaries** including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, **Multeen and Clodiagh in Co. Tipperary** *(authors emphasis)*. The Suir and its tributaries flow through the counties of Tipperary, Kilkenny and Waterford.

5.5.1.1 Screening of the Potential for the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to cause effects to Qualifying Interests of the Lower River Suir SAC

The potential for impact pathways between Whole UWF Project (including the Proposed Larger Turbines & Met Masts) and the Qualifying Interests of the Lower River Suir SAC are further examined in table 5-8 below.

In summary, the findings are that:

There is potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to impact the following Qualifying Interests:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
- Alluvial Forests (91E0)* (priority habitat)
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
- Yew Woodlands* *Taxus baccata* woods of the British Isles [91J0] (priority habitat)
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- Freshwater Pearl Mussel [1029]
- White-clawed Crayfish [1092]
- Sea Lamprey [1095]
- Brook Lamprey [1096]
- River Lamprey [1099]
- Atlantic Salmon [1106]
- Otter [1355]

The SAC and above listed Qualifying Interests are brought forward for Stage 2 Appropriate Assessment.

Stage 1: Screening

AA Report 2021

All of the other Qualifying Interests (Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean salt meadows (*Juncetalia maritimi*) and Twaite Shad (*Alosa fallax fallax*)) are screened out from further evaluation because there is no potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) (either directly, indirectly or in-combination with other projects) to cause any effect to these Qualifying Interests.

Table 5-8: Screening Exercise for the Lower River Suir SAC (002137)

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	The description of habitat 3260 covers upland rivers with bryophytes and macroalgae to lowland depositing rivers with pondweeds and starworts. The selection of Lower River Suir SAC used this broad interpretation. Conservation objectives for habitat 3260 concentrate on the high conservation value sub-types, however, little is known of the habitat's distribution or its sub-types in Lower River Suir SAC. There is a large number of lowland and tidal rivers in the SAC, as well as faster-flowing tributaries.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	The location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, therefore there is no potential for direct effects to this Qualifying Interest habitat. However, the potential for indirect effects via hydrological connection or spread of invasive species does exist.	**Screened Out** – for Direct Impacts (SAC Pathway 1) **Screened In** for further evaluation at Stage 2 for **SAC Pathways 2 and 3**
Alluvial Forests (91E0)* (* priority habitat)	Alluvial forest was surveyed in Lower River Suir SAC at Fiddown Mountbolton and Ballycanvan Big Further unsurveyed areas of alluvial forest are present within the SAC, for example at islands below Carrick-on-Suir, at Shanbally, Tibberaghny Marshes, along the lower stretches of the more westerly of the Suir tributaries and along both banks of	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in	The location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, therefore there is no potential for direct effects to this Qualifying Interest habitat. Although the cited locations of this Qualifying Interest habitat are at a substantial separation distance from the Whole UWF Project, there exists the potential for indirect effects via	**Screened Out** – for Direct Pathways (SAC Pathway 1) **Screened In** for further evaluation at Stage 2 for **SAC Pathways 2 and 3**

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
	the Suir as far east as the Dawn River.	water quality or spread of invasive species) ex-situ the SAC	hydrological connection or spread of invasive species.	
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	The total area of the qualifying habitat in the SAC is unknown. The lowland type communities of the habitat are considered to occur in association with the various areas of alluvial forest within the SAC, notably at Fiddown, below Carrick-on-Suir and at Tibberaghny Marshes. This habitat type would also be expected to occur in association with other woodland types in fringe areas along the river and with areas of open marsh or wet grassland within the SAC.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	The location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, therefore there is no potential for direct effects to this Qualifying Interest habitat. Although the cited locations of this Qualifying Interest habitat are at a substantial separation distance from the Whole UWF Project, this habitat may occur at other locations, and there exists the potential for indirect effects via hydrological connection or spread of invasive species.	**Screened Out** – for Direct Impacts (SAC Pathway 1) **Screened In** for further evaluation at Stage 2 for **SAC Pathways 2 and 3**
Yew Woodlands* *Taxus baccata* woods of the British Isles [91J0] (* priority habitat)	*Taxus baccata* woods of the British Isles habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat is unknown. Yew (*Taxus baccata*) woodland is known to occur at Cahir Park and at Shanbally.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in	The location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, therefore there is no potential for direct effects to this Qualifying Interest habitat. Although the cited locations of this Qualifying Interest habitat are at a substantial separation distance from the Whole UWF Project, this habitat may occur at other locations, and there exists the potential for indirect effects via	**Screened Out** – for Direct Impacts (SAC Pathway 1) **Screened In** for further evaluation at Stage 2 for **SAC Pathways 2 and 3**

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
		water quality or spread of invasive species) ex-situ the SAC	hydrological connection or spread of invasive species.	
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	The best examples of old sessile oak woods are seen in Portlaw Wood which lies on both sides of the Clodiagh River *(in County Waterford)*. Old sessile oak wood habitat also occurs in Inchinsquillib Wood (in County Tipperary) which consists of three small separate sloping blocks of woodland in a valley cut by the young Multeen River and its tributaries. Old sessile oak woods with Ilex and Blechnum were surveyed in Lower River Suir SAC at Lyranearla and Inchinsqullib Wood. It is important to note that further unsurveyed areas are present within the SAC, including at Portlaw Wood within the Curraghmore Estate and other small pockets within the SAC.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	The location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, therefore there is no potential for direct effects to this Qualifying Interest habitat. Although the cited locations of this Qualifying Interest habitat are at a substantial separation distance from the Whole UWF Project, this habitat may occur at other locations, and there exists the potential for indirect effects via hydrological connection or spread of invasive species.	**Screened Out** – for Direct Impacts (SAC Pathway 1) **Screened In** for further evaluation at Stage 2 for **SAC Pathways 2 and 3**

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Freshwater Pearl Mussel [1029]	The conservation objective for Freshwater Pearl Mussel applies to the Clodiagh freshwater pearl mussel (*Margaritifera margaritifera*) population. This population is in the Clodiagh River in Portlaw, County Waterford and not the Clodiagh River in County Tipperary. These two rivers are not hydrologically connected. The nearest Freshwater Pearl Mussel (FPM) population to the Whole UWF Project is an extant population in the Clodiagh (Tipperary) and Multeen Rivers.	SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	The Whole UWF Project (including the Proposed Larger Turbines & Met Masts) works are located approximately 17km upstream at their closest point from the nearest Freshwater Pearl Mussel (FPM) population (extant) in the Clodiagh (Tipperary). The location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC and does not overlap the extent of any FPM populations either within or ex-situ the SAC boundary; therefore there is no potential for direct effects to this Qualifying Interest species (i.e. via SAC Pathway 4) either within or ex-situ the SAC. SAC Pathways 5 & 7 - Aquatic invertebrates are not sensitive to disturbance and displacement arising from human activity and therefore there is no likelihood of significant disturbance or displacement effects (via SAC Pathway 5 or 7). SAC Pathways 6 & 8 - Although the population of FPM to which the Conservation Objectives relate are in a watercourse which is not hydrologically connected with Whole UWF Project (including the Proposed Larger Turbines & Met Masts), and therefore impact pathways do not exist, there are extant	**Screened Out** – for SAC Pathways 4, 5 & 7 - no likelihood of significant effects to this Qualifying Interest. **Screened In** for further evaluation at Stage 2 for **SAC Pathways 6 and 8**

Stage 1: Screening

AA Report 2021

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
			populations of FPM downstream (17km) of Whole UWF Project (including the Proposed Larger Turbines & Met Masts), and populations may also exist at other locations in the catchment, and there exists the potential for indirect effects via hydrological connection or spread of invasive species either upstream or downstream, or along transport routes associated with Whole UWF Project.	
White-clawed Crayfish [1092]	White-clawed crayfish occurs extensively on the River Suir and on many of its tributaries.	SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	The location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, therefore there is no potential for direct mortality effects within the SAC. In relation to ex-situ effects (via Pathway 4), although the Whole UWF Project (UWF Related Works element only) will involve instream works in watercourses with fisheries value where white clawed crayfish may occur, given the low number of locations and that the streams involved are headwater streams in the upper reaches of the catchment, it is considered that there is no likelihood of significant mortality effects ex-situ the SAC, and consequently this QI is screened out from mortality effects via SAC Pathway 4. SAC Pathways 5 & 7 - Aquatic invertebrates are not sensitive to disturbance and displacement	**Screened Out** – for SAC Pathways 4, 5 & 7 - no likelihood of significant effects to this Qualifying Interest. **Screened In** for further evaluation at Stage 2 for **SAC Pathways 6 and 8**

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
			arising from human activity and therefore there is no likelihood of significant disturbance or displacement effects (via SAC Pathway 5 or 7). SAC Pathways 6 & 8 - However, this Qualifying Interest species occurs extensively in the Suir catchment, and the potential exists for indirect effects via hydrological connection or spread of invasive species to populations of this Qualifying Interest either upstream or downstream, or along transport routes associated with Whole UWF Project (including the Proposed Larger Turbines & Met Masts).	
Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106]		SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC	While the location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, the UWF Related Works Element (only) will involve instream works in watercourses with fisheries value within the catchment, and therefore these QI species are screened in for futher evaluation on a precautionary basis for SAC Pathways 4, 5, and 7. SAC Pathway 6 & 8: In addition, these Qualifying Interest species occur within the Suir catchment, and the potential exists for indirect effects via hydrological connection or spread of invasive species either upstream or	**Screened In** for further evaluation at Stage 2 for **SAC Pathways 4** *(ex-situ only),* and **SAC Pathways 5 to 8**

Stage 1: Screening

AA Report 2021

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
		SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	downstream, or along transport routes associated with Whole UWF Project (including the Proposed Larger Turbines & Met Masts).	
Otter [1355]		SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	While, the location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, the UWF Related Works Element (only) will involve instream works in watercourses with fisheries value within the catchment, and therefore this QI is screened in on a precautionary basis for ex-situ effects in relation to mortality and disturbance/displacement effects. In addition, this Qualifying Interest species is expected to occur throughout the Suir catchment, and the potential exists for indirect effects via hydrological connection or spread of invasive species to either upstream or downstream, or along transport routes associated with Whole UWF Project (including the Proposed Larger Turbines & Met Masts).	**Screened In** for further evaluation at Stage 2 for **SAC Pathway 4** *(ex-situ only)* and **SAC Pathways 5 to 8**
Atlantic salt meadows [1330]	These Qualifying Interests habitats are either coastal habitats or located in coastal or transitional waters.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC	**No impact pathway** - The Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is located at a substantial distance (c.130km) from the part of the SAC where	**Screened Out** – for SAC Pathways 1 to 3, no likelihood of significant effects to

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Mediterranean salt meadows [1410]		SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	these habitats occur, therefore no impact pathway for direct effects exists. In relation to indirect effects, while the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is located upstream of these habitats, it is evaluated that there is no likelihood of Whole UWF Project (including the Proposed Larger Turbines & Met Masts) causing effects to these habitats based on separation distance, the substantial dilution and dispersion within the sub-catchment, and the location of these Qualifying Interests in coastal or transitional waters.	this Qualifying Interest.
Twaite Shad [1103]	The SAC is one of only three known spawning grounds in the country for Twaite Shad.	SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC	The location of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) does not overlap the boundary of the Lower River Suir SAC, and it is considered that there is no likelihood of Twaite Shad being present in watercourses with fisheries value at	**Screened Out** – for SAC Pathways 4 to 8, no likelihood of significant effects to this Qualifying Interest.

Qualifying Interests (QI) of the Lower River Suir SAC **Site Code: 002137**	**Notes on Qualifying Interest**	**Potential Impact Pathways to Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Suir SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
	Twaite Shad spawn in calm waters about 1km upstream of the old bridge in Carrick-on-Suir	SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	instream works locations; therefore there is no likelihood for direct effects to this Qualifying Interest species. In relation to indirect effects, Twaite Shad is known to spawn c.100km downstream in Carrick-on-Suir, the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is located at a substantial separation distance from the cited population. Therefore it is evaluated that Whole UWF Project (including the Proposed Larger Turbines & Met Masts) has no likelihood of causing effects to Twaite Shad based on separation distance, and the substantial dilution and dispersion within the sub-catchment.	

5.5.2 Screening Exercise for the Lower River Shannon SAC (002165)

The Lower River Shannon SAC is a very large site, which stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head. The site encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), **the freshwater stretches of much of the Feale and Mulkear catchments** and the marine area between Loop Head and Kerry Head *(authors emphasis)*. There are numerous tributary rivers within the freshwater stretches of the Feale and Mulkear catchments. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. **Rivers within the sub-catchment of the Mulkear include** the Killeenagarriff, **Annagh (Clare), Newport,** Dead, **Bilboa,** Glashacloonaraveela, Gortnageragh and Cahernahallia*(authors emphasis)*.

This site contains the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. This site supports more wintering wildfowl and waders than any other site in the country and supports a large number of migratory birds.

5.5.2.1 Screening of the Potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to cause effects to Qualifying Interests of the Lower River Shannon SAC

The potential for impact pathways between Whole UWF Project (including the Proposed Larger Turbines & Met Masts) (either directly, indirectly or in-combination with other projects) and the Qualifying Interests of the Lower River Shannon SAC are further examined in the Table 5-9 below.

In summary, the findings are that:

There is potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to impact the following Qualifying Interests:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
- Alluvial Forests (91E0)* (priority habitat)]
- Atlantic Salmon [1106]
- Sea Lamprey [1095]
- Brook Lamprey [1096]
- River Lamprey [1099]
- Otter [1355]
- The SAC and above listed Qualifying Interests are brought forward for Stage 2 Appropriate Assessment.

All of the other Qualifying Interests are screened out from further evaluation because there is no potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) (either directly, indirectly or in-combination with other projects) to cause any significant effect to these Qualifying Interests.

Table 5-9: Screening Exercise for the Lower River Shannon SAC

Qualifying Interests (QI) of the Lower River Shannon SAC **Site Code: 002165**	**Notes on Qualifying Interest**	**Potential Effect(s) On Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Shannon SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	The description of this Qualifying Interest habitat is broad, covering rivers from upland bryophyte and macroalgal dominated stretches, to lowland depositing rivers with pondweeds and starworts. A rich bryophyte flora has been recorded from the Bilboa River. The bryophyte-rich habitat was found in mature river stretches of 10-12 m, occasionally up to 20 m, wide, which varied from riffles and cascades to pools. In addition to these known important bryophyte-rich streams and rivers in the site, there are likely to be other stretches with bryophyte-rich sub-types.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	The UWF Grid Connection element of the Whole UWF Project has connectivity of impact pathways with this Qualifying Interest habitat where the 110kV UGC crosses through the SAC boundary over Bilboa River (in the structure of the Anglesey Bridge). None of the Other Elements of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) overlap the boundary of this SAC. There is also potential connectivity also via hydrological pathways and transport routes associated with the Whole UWF Project.	**Screened In** for further evaluation at Stage 2 for **SAC Pathways 1 ,2 & 3**

Qualifying Interests (QI) of the Lower River Shannon SAC **Site Code: 002165**	**Notes on Qualifying Interest**	**Potential Effect(s) On Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Shannon SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099]	Five species of fish listed on Annex II of the E.U. Habitats Directive are found within this SAC site. These are Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad and Salmon. The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Mulkear catchment excels as a grilse fishery. Twaite Shad is not thought to spawn within the site and is not listed as a Qualifying Interest in this SAC.	SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	The UWF Grid Connection has connectivity of impact pathways with these Qualifying Interest species at crossing locations of the 110kV UGC over the SAC in the structure of existing Rockvale Bridge and Anglesey Bridge, and at the other watercourse crossing locations at Mountphilips Substation site and along the 110kV UGC route within the catchment. None of the Other Elements of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) overlap the boundary of this SAC. There is also potential connectivity also via hydrological pathways and transport routes associated with the Whole UWF Project.	**Screened In** for further evaluation at Stage 2 for **SAC Pathways 4 to 8**

Stage 1: Screening

AA Report 2021

Qualifying Interests (QI) of the Lower River Shannon SAC **Site Code: 002165**	**Notes on Qualifying Interest**	**Potential Effect(s) On Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Shannon SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Otter [1355]	Otter is commonly found in the SAC. Otters will utilise freshwater habitats from estuary to headwaters.	SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	The UWF Grid Connection element of the Whole UWF Project has connectivity of impact pathways where the 110kV UGC is located within the boundary of the SAC, at crossing locations over the SAC in the structure of existing Rockvale Bridge and Anglesey Bridge, and at the other watercourse crossing locations at Mountphilips Substation site and along the 110kV UGC route within the catchment. None of the Other Elements of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) overlap the boundary of this SAC nor will any of the other elements involve instream works in watercourses with fisheries value within the catchment for the Lower River Shannon SAC. There is also potential connectivity also via hydrological pathways and transport routes	**Screened In** for further evaluation at Stage 2 for **SAC Pathways 4 to 8**

Qualifying Interests (QI) of the Lower River Shannon SAC **Site Code: 002165**	**Notes on Qualifying Interest**	**Potential Effect(s) On Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Shannon SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
			associated with the Whole UWF Project.	
Alluvial Forests (91E0)* (* priority habitat)	Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north-east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, oak and birch. Further areas are likely to be present within the SAC	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	The Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is located at a distance from the cited locations where these habitats occur, and no alluvial forest habitat was recorded within 50m of the UWF Grid Connection or Other Elements of the Whole UWF Project. Therefore, there is no potential for direct effects. However, the potential for indirect effects via hydrological connection or spread of invasive species does exist.	**Screened Out –** for Direct Impacts (SAC Pathway 1 **Screened In for further evaluation at Stage 2 for SAC Pathway 2 and 3**
Molinia Meadows [6410]	This habitat has been recorded on the eastern bank of the Shannon, just north of Castleconnell, Co. Limerick. Full	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC	The Whole UWF Project is located at a distance from the cited locations where these habitats occur, and no *Molinia* Meadows	**Screened Out** – for Direct Impacts (SAC Pathway 1)

Stage 1: Screening

AA Report 2021

Qualifying Interests (QI) of the Lower River Shannon SAC **Site Code: 002165**	**Notes on Qualifying Interest**	**Potential Effect(s) On Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Shannon SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
	distribution of this habitat in this site is currently unknown and it almost certainly occurs elsewhere.	SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	habitat was recorded within 50m of the UWF Grid Connection or Other Elements of the Whole UWF Project. Therefore, there is no potential for direct effects. Separation distance and the absence of pathways to terrestrial habitats precludes secondary effects.	**Screened Out** - for **SAC Pathway 2 and 3**, no likelihood of significant effects to this Qualifying Interest
Freshwater Pearl Mussel [1029]	The cited Qualifying Interest population is in the Cloon River in County Clare only, to the north of the River Shannon Estuary.	SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	The Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is located at a substantial separation distance from the cited population. In addition, Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is **not hydrologically connected** with the location of the cited population is in the Cloon River in County Clare, to the north of the River Shannon Estuary. Therefore it is evaluated that the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) have no likelihood of	**Screened Out** - for **SAC Pathway 4 to 8**, no likelihood of significant effects to this Qualifying Interest

Qualifying Interests (QI) of the Lower River Shannon SAC **Site Code: 002165**	**Notes on Qualifying Interest**	**Potential Effect(s) On Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Shannon SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
			adversely affecting Freshwater Pearl Mussel, or their supporting species.	
Bottlenose Dolphin [1349]	There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary, west of Limerick	SAC Pathway 4: Direct effects to QI species of an SAC Site (i.e. mortality) within or ex-situ the SAC SAC Pathway 5: Indirect effects to QI species of an SAC Site (i.e. disturbance /displacement) within the SAC SAC Pathway 6: Indirect effects to QI species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 7: Indirect effects to QI species of the SAC Site (i.e. disturbance /displacement) ex-situ the SAC SAC Pathway 8: Indirect effects to QI species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC.	The Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is located at a substantial separation distance from the cited population. Therefore it is evaluated that the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) has no likelihood of causing effects to *Bottlenose Dolphin* based on separation distance, the substantial dilution and dispersion within the sub-catchment.	**Screened Out** - for **SAC Pathway 4 to 8**, no likelihood of significant effects to this Qualifying Interest.

Qualifying Interests (QI) of the Lower River Shannon SAC **Site Code: 002165**	**Notes on Qualifying Interest**	**Potential Effect(s) On Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lower River Shannon SAC**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Sandbanks which are slightly covered by sea water all the time [1110] Estuaries (1130) Mudflats and Sandflats not covered by seawater all the time (1140) Coastal Lagoons (1150) Large shallow inlets and bays (1160) Reefs (1170) *Salicornia* and other annuals colonizing mud and sand [1310] Atlantic Salt Meadows (1330) Mediterranean Salt Meadows (1410) Perennial Vegetation of Stony Banks (1220) Vegetated Sea Cliffs (1230)	These Qualifying Interests habitats are either coastal habitats or located in coastal or transitional waters.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	**No impact pathway** - The Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is located at a distance from the part of the SAC where these habitats occur, therefore no impact pathway for direct effects exists. In relation to indirect effects, while the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) is located upstream of these habitats, it is evaluated that there is no likelihood of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) causing effects to these habitats based on separation distance, the limited footprint of works the substantial dilution and dispersion within the sub-catchment, and the location of these Qualifying Interests in coastal or transitional waters.	**Screened Out** - for **SAC Pathway 1 to 3**, no likelihood of significant effects to this Qualifying Interest. .

5.5.3 Screening Exercise for the Clare Gen SAC (000930)

Clare Glen lies on the Limerick - Tipperary border, in the western foothills of the Slievefelim Mountains, about 10 km north-west of Cappamore. The glen was formed by the action of the Clare River cutting into the Old Red Sandstone. The site comprises the wooded river valley about 2km above the Clare Bridge.

5.5.3.1 Screening of the Potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to cause effects to Qualifying Interests of the Clare Glen SAC

The potential for impact pathways between Whole UWF Project (including the Proposed Larger Turbines & Met Masts) and the Qualifying Interests of the Clare Glen SAC are examined in table 5-10 below.

In summary, the findings are that:

There is potential for UWF Grid Connection <u>(only)</u> to impact the following Qualifying Interests:

- Old Oak Woodlands [91A0]
- Killarney Fern (*Trichomanes speciosum*) [1421]
- The SAC and above listed Qualifying Interests are brought forward for Stage 2 Appropriate Assessment.

<u>No Qualifying Interests have been screened out</u>.

Table 5-10: Screening Exercise for the Clare Glen SAC (000930)

Qualifying Interests (QI) of the Clare Glen SAC Site Code: 000930	**Notes on Qualifying Interest**	**Potential Effect(s) On Qualifying Interests**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Clare Glen SAC**	**Potential for significant effects? Yes – Screened In for further evaluation at Stage 2, or No – Screened out**
Old Oak Woodlands [91A0]	The woodland in Clare Glen SAC occurs along the Clare River valley and is of mixed composition with native broadleaves and non-native conifers and beech (Fagus sylvatica). The woodland, although planted with many exotic trees, is mature and conforms to a type listed on Annex II of the E.U. Habitats Directive. A rich bryophyte flora is associated with the river and the wet rocks around it. The site is also notable for the presence of several rare species of Myxomycete fungus.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	The locations of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) do not overlap the boundary of the Clare Glen SAC, therefore there is no potential for direct effects to this Qualifying Interest habitat. However the potential for indirect effects to QI Habitats does exist with the UWF Grid Connection via hydrological connection and via transport routes. None of the Other Elements (including the Proposed Larger Turbines & Met Masts) are hydrologically connected to this SAC.	**Screened Out** – for Direct Impacts (SAC Pathway 1) **Screened In** for further evaluation at Stage 2 for **SAC Pathways 2 and 3**
Killarney Fern (*Trichomanes speciosum*) [1421]	The population of rare and legally protected (Flora (Protection) Order, 1999) Killarney Fern (*Trichomanes speciosum*) is currently known from several locations in Clare Glen SAC.	SAC Pathway 1: Direct effects to QI habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC SAC Pathway 2: Indirect Effects to QI habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC SAC Pathway 3: Indirect Effects to QI habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	The locations of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) do not overlap the boundary of the Clare Glen SAC, therefore there is no potential for direct effects to this Qualifying Interest plant species. However the potential for indirect impacts does exist with the UWF Grid Connection via hydrological connection and via transport routes. None of the Other Elements (including the Proposed Larger Turbines & Met Masts) are hydrologically connected to this SAC	**Screened Out** – for Direct Impacts (SAC Pathway 1) **Screened In** for further evaluation at Stage 2 for **SAC Pathways 2 and 3**

5.5.4 Screening Exercise for the Slievefelim to Silvermines Mountain SPA (004165)

The SPA is an extensive upland site located in Counties Tipperary and Limerick. Much of the site is over 200m in altitude and rises to 694m at Keeper Hill. Other peaks included in the site are Slieve Felim, Knockstanna, Knockappul, Mother Mountain, Knockteige, Cooneen Hill and Silvermine Mountain. The site consists of a variety of upland habitats, though approximately half is afforested. The remainder of the site is mostly rough grassland that is used for hill farming. Some stands of deciduous woodland also occur, especially within the river valleys.

The mix of forestry and open areas provides optimum habitat conditions for Hen harrier. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath.

Hen Harriers will forage up to c. 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey.

The site is also a traditional breeding site for a pair of Peregrine. Merlin has been recorded within the site but further survey is required to determine its status. Red Grouse is found on some of the unplanted areas of bog and heath.

5.5.4.1 Screening of the Potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to cause effects to Special Conservation Interest of the Slievefelim to Silvermines Mountain SPA

The potential for impact pathways between Whole UWF Project (including the Proposed Larger Turbines & Met Masts) and the Special Conservation Interest species of the Slievefelim to Silvermines Mountain SPA are further examined in Table 5-11 below.

In summary, the findings are that:

There is potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to impact the following Special Conservation Interests:

- Hen Harrier [A082]

The SPA/ Special Conservation Interest is brought forward for Stage 2 Appropriate Assessment.

No Special Conservation Interests have been screened out.

Table 5-11: Screening Exercise for the Slievefelim to Silvermines Mountain SPA (004165)

Special Conservation Interests (SCI) of the Slievefelim to Silvermines Mountain SPA **Site Code: 004165**	**Notes on Special Conservation Interest**	**Potential Effect(s) On Special Conservation Interest**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Slievefelim to Silvermines Mountain SPA**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Hen Harrier	The Slievefelim to Silvermines Mountains SPA is of ornithological importance because it provides excellent nesting and foraging habitat for breeding Hen Harrier and is one of the top sites in the country for the species	**SPA Pathway 1**: Direct disturbance or mortality effects to **SCI species within an SPA**	Neither the Upperchurch Windfarm, nor the Proposed Larger Turbines & Met Masts amendment, nor the UWF Replacement Forestry overlap the boundary of this SPA. However, the location of the UWF Grid Connection and a small section of UWF Related Works *(HW7 only*) overlaps the boundary of the Slievefelim to Silvermines Mountain SPA, therefore there is potential for direct effects to the Special Conservation Interest species.	**Screened In** for further evaluation at Stage 2 for **SPA Pathway 1**
		SPA Pathway 2: Indirect effects to SCI species within an SPA (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species) SPA Pathway 3: Indirect effects to SCI species ex-situ an SPA (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, or through a reductions in prey item species outside their respective SPA).	The location of the UWF Grid Connection and a small section of UWF Related Works *(HW7 only*) overlaps and occurs in close proximity to the boundary of the Slievefelim to Silvermines Mountain SPA, therefore there is potential for indirect effects to the Special Conservation Interest of the SPA. At locations outside the boundary of the SPA, the Whole UWF Project elements (including Upperchurch Windfarm and the Proposed Larger Turbines & Met Masts amendment), have potential to cause ex-situ secondary effects, through a reduction in potential habitat as a result of the construction of the Upperchurch Windfarm and collision risk impact and habitat loss impact on prey item species.	**Screened In** for further evaluation at Stage 2 for **SPA Pathways 2 and 3**

Special Conservation Interests (SCI) of the Slievefelim to Silvermines Mountain SPA **Site Code: 004165**	**Notes on Special Conservation Interest**	**Potential Effect(s) On Special Conservation Interest**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Slievefelim to Silvermines Mountain SPA**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
		SPA Pathway 4: Indirect effects to SCI species ex-situ an SPA (i.e. disturbance or mortality effects to SCI species outside their respective SPA).	There is potential connectivity with Whole UWF Project construction works and activities being conducted outside of the SPA, and connectivity during the operational stage with the Upperchurch Windfarm urbines (either authorised or proposed larger turbines). As such, the Whole UWF Project elements have potential to cause ex-situ effects to the SCI through disturbance and mortality at locations outside the boundary of the SPA.	**Screened In** for further evaluation at Stage 2 for **SPA Pathway 4**

5.5.5 Screening Exercise for the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)

The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is a very large site centred on the borders between the counties of Cork, Kerry and Limerick. The mountains; Knockfeha, Mount Eagle, Knockanefune, Garraunbaun, Taur, Rock Hill, Knockacummer, Mullaghamuish, Knight's Mt, Ballincollig Hill, Beennageeha Mt, Sugar Hill, Knockanimpuba and Knockathea, amongst others are included in this site. Many rivers rise within the site, notably the Blackwater, Owentaraglin, Owenkeal, Glenlara, Feale, Clydagh, Allaghaun, Allow, Oolagh, Galey and Smerlagh.

The site is of ornithological importance because it provides nesting and foraging habitat for breeding Hen Harrier. The annex I species Merlin and Short-eared Owl have also been recorded on site.

5.5.5.1 Screening of the Potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to cause effects to Special Conservation Interest of the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA

The potential for impact pathways between Whole UWF Project (including the Proposed Larger Turbines & Met Masts) and the Special Conservation Interests of the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA are further examined in Table 5-12 below.

The Special Conservation Interest of this the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA is:

- Hen Harrier [A082]

In summary, the findings are that:

- **The SPA/Special Conservation Interest is screened out from further evaluation** because there is no potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) (either directly, indirectly or in-combination with other projects) to cause any significant effect to the Special Conservation Interest of the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA**.**

Table 5-12: Screening Exercise for the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)

Special Conservation Interests (SCI) of the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA **Site Code: 004161**	**Notes on Special Conservation Interest**	**Potential Effect(s) On Special Conservation Interest**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Hen Harrier	Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA is a stronghold for Hen Harrier and supports the largest concentration of the species in the country.	SPA Pathway 4: Indirect effects to SCI species ex-situ an SPA (i.e. disturbance or mortality effects to SCI species outside their respective SPA).	In relation to disturbance to SCI species Hen Harrier ex-situ the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA, the separation distance precludes effects in relation to disturbance. Whilst wintering Hen Harrier individuals from the Mullaghareirks SPA may occur in proximity to Whole UWF Project works, there is significant separation distance, demonstrated numbers in the vicinity of the Whole UWF Project (including the proposed amendment) are low from baseline studies, effects will be momentary-brief in duration; unlikely to affect any individual >150m from source; and Highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available, with no probability of resultant effects on breeding birds or the reference population of the Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA. In relation to displacement from operating turbines (either authorised or Proposed Larger Turbines), it is considered that there is no likelihood for significant effects due to the separation distance between the SPA and the UWF turbine locations. There is no source of collision risk associated with the UWF Grid Connection or UWF Related Works (in particular no overhead wires likely to affect Hen Harriers). Whilst there is potential connectivity with the Whole UWF Project during the operational stage of the Upperchurch Windfarm turbines (either authorised turbines or Proposed Larger Turbines), the potential/likelihood for significant effects can be excluded because of the substantial separation distance of over 65km between the proposed turbine locations and the Stack's to Mullagherierk Mountains, West Limerick Hills & Mount Eagle SPA.	**Screened Out** – for SPA Pathway 4

5.5.6 Screening Exercise for the Lough Derg (Shannon) SPA (004058)

Lough Derg lies within counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes. The greater part of the lake lies on Carboniferous limestone while the narrow southern section is underlain by Silurian strata.

The site is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In winter, it has nationally important populations of Tufted Duck and Goldeneye. The Annex I species Whooper Swan, Greenland White-fronted Goose and Hen Harrier have also been recorded on site.

5.5.6.1 Screening of the Potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to cause effects to Special Conservation Interests of the Lough Derg (Shannon) SPA

The Special Conservation Interests of this the Lough Derg (Shannon) SPA are:

- Cormorant (*Phalacrocorax carbo*) (A017)
- Tufted Duck (*Aythya fuligula*) (A061)
- Goldeneye (*Bucephala clangula*) (A067)
- Common Tern (*Sterna hirundo*) (A193)
- Wetland and Waterbirds (A999)

The potential for impact pathways between Whole UWF Project (including the Proposed Larger Turbines & Met Masts) and the Special Conservation Interests of the Lough Derg (Shannon) SPA (004058) are further examined in Table 5-13 below.

In summary, the findings are that:

- **The SPA/Special Conservation Interest is screened out from further evaluation** because there is no potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) (either directly, indirectly or in-combination with other projects) to cause any significant effect to the Special Conservation Interests of the Lough Derg (Shannon) SPA (004058)**.**

Table 5-13: Screening Exercise for the Lough Derg (Shannon) SPA (004058)

Special Conservation Interests (SCI) of the Lough Derg (Shannon) SPA **Site Code: 004058**	**Notes on Special Conservation Interest**	**Potential Effect(s) On Special Conservation Interest**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lough Derg (Shannon) SPA**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Cormorant (*Phalacrocorax carbo* (A017) Tufted Duck (*Aythy fuligula*) (A061) Goldeneye (*Bucephal clangula*) (A067) Common Tern (*Stern hirundo*) (A193) Wetland and Waterbird (A999)	Lough Derg (Shannon) SPA is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In Winter, it supports nationally important populations of Tufted Duck andGoldeneye. The Annex I species Whooper Swan, Greenland White-fronted Goose and Hen Harrier have also been recorded on site.	SPA Pathway 4: Indirect effects to SCI species ex-situ an SPA (i.e. disturbance or mortality effects to SCI species outside their respective SPA).	In relation to disturbance to SCI species for Lough Derg (Shannon) SPAs ex-situ the SPA, the separation distance precludes effects in relation to disturbance. Any passage wildfowl (SCI for 004058) will only transit over Whole UWF Project works and there are no defined feeding or roosting sites at works areas or within the footprint of the Whole UWF Project (including within 500m of the Proposed Larger Turbines and Met Masts) where they would experience disturbance/displacement effects whilst resting on migration, with no probability of resultant effects on breeding birds or the reference population of the SPA. In relation to displacement from operating turbines (either authorised or Proposed Larger Turbines), it is considered that there is no likelihood for significant effects to these Special Conservation Interests due the separation distance of the turbine locations to this SPA, and the absence of suitable foraging or breeding habitat for waterbirds in the vicininty of the proposed trubines. There is no source of collision risk associated with the UWF Grid Connection or UWF Related Works (in particular no overhead wires likely to affect wildfowl or Hen Harriers). Whilst there is potential connectivity with Whole UWF Project during the operational stage with the Upperchurch Windfarm turbines (either authorised turbines or Proposed Larger Turbines), the potential/likelihood for significant effects can be excluded because any passage wildfowl will only transit over the Upperchurch Windfarm site and there are no defined	**Screened Out** – for SPA Pathway 4

Special Conservation Interests (SCI) of the Lough Derg (Shannon) SPA **Site Code: 004058**	**Notes on Special Conservation Interest**	**Potential Effect(s) On Special Conservation Interest**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the Lough Derg (Shannon) SPA**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
			feeding or roosting sites at works areas or within the footprint of the Whole UWF Project (including within 500m of the proposed Larger Turbines and Met Masts) where they would experience collision risk effects while flying. The abundance of wildfowl flying at the height level of the turbine blades will be low due to the separation distance.	

5.5.7 Screening Exercise for the River Shannon and River Fergus Estuaries SPA (004077)

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry.

The site has vast expanses of intertidal flats which contain a diverse macroinvertebrate community, e.g. *Macoma-Scrobicularia-Nereis*, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries.

5.5.7.1 Screening of the Potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to cause effects to Special Conservation Interests of the River Shannon and River Fergus Estuaries SPA

The potential for impact pathways between Whole UWF Project (including the Proposed Larger Turbines & Met Masts) and the Special Conservation Interests of the River Shannon and River Fergus Estuaries SPA are further examined in Table 5-14 below.

The Special Conservation Interests of this the River Shannon and River Fergus Estuaries SPA are:

- Cormorant (*Phalacrocorax carbo*) (A017)
- Whooper Swan (*Cygnus cygnus*) (A038)
- Light-bellied Brent Goose (*Branta bernicla hrota*) (A046)
- Shelduck (*Tadorna tadorna*) (A048)
- Wigeon (*Anas penelope*) (A050)
- Teal (*Anas crecca*) (A052)
- Pintail (*Anas acuta*) (A054)
- Shoveler (*Anas clypeata*) (A056)
- Scaup (*Aythya marila*) (A062)
- Ringed Plover (*Charadrius hiaticula*) (A137)
- Golden Plover (*Pluvialis apricaria*) (A140)
- Grey Plover (*Pluvialis squatarola*) (A141)
- Lapwing (*Vanellus vanellus*) (A142)
- Knot (*Calidris canutus*) (A143)
- Dunlin (*Calidris alpina*) (A149)
- Black-tailed Godwit (*Limosa limosa*) (A156)
- Bar-tailed Godwit (*Limosa lapponica*) (A157)
- Curlew (*Numenius arquata*) (A160)
- Redshank (*Tringa totanus*) (A162)
- Greenshank (*Tringa nebularia*) (A164)
- Black-headed Gull (*Chroicocephalus ridibundus*) (A179)
- Wetland and Waterbirds (A999)

In summary, the findings are that:

The SPA/Special Conservation Interest species are screened out from further evaluation because there is no potential for Whole UWF Project (including the Proposed Larger Turbines & Met Masts) (either directly, indirectly or in-combination with other projects) to cause any significant effect to the Special Conservation Interests of the River Shannon and River Fergus Estuaries SPA (004077)**.**

Table 5-14: Screening Exercise for the River Shannon and River Fergus Estuaries SPA (004077)

Special Conservation Interests (SCI) of the Lough River Shannon and River Fergus Estuaries SPA **Site Code: 004077**	**Notes on Special Conservation Interest**	**Potential Effect(s) On Special Conservation Interest**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the River Fergus Estuaries SPA**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
Cormorant (*Phalacrocorax carbo*) (A017) Whooper Swan (*Cygnus cygnus*) (A038) Light-bellied Brent Goose (*Branta bernicla hrota*) (A046) Shelduck (*Tadorna tadorna*) (A048) Wigeon (*Anas penelope*) (A050) Teal (*Anas crecca*) (A052) Pintail (*Anas acuta*) (A054) Shoveler (*Anas clypeata*) (A056) Scaup (*Aythya marila*) (A062) Ringed Plover (*Charadrius hiaticula*) (A137) Golden Plover (*Pluvialis apricaria*) (A140) Grey Plover (*Pluvialis squatarola*) (A141) Lapwing (*Vanellus vanellus*) (A142) Knot (*Calidris canutus*) (A143) Dunlin (*Calidris alpina*) (A149) Black-tailed Godwit (*Limosa limosa*) (A156) Bar-tailed Godwit (*Limosa lapponica*) (A157) Curlew (*Numenius arquata*) (A160) Redshank (*Tringa totanus*) (A162) Greenshank (*Tringa nebularia*) (A164) Black-headed Gull (*Chroicocephalus ridibundus*) (A179) Wetland and Waterbirds (A999)	The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds.	SPA Pathway 4: Indirect effects to SCI species ex-situ an SPA (i.e. disturbance or mortality effects to SCI species outside their respective SPA).	In relation to disturbance to SCI species for the River Shannon and River Fergus Estuaries SPA ex-situ the SPA, the separation distance precludes effects in relation to disturbance. Any passage wildfowl (SCI for 004077) will only transit over Whole UWF Project works and there are no defined feeding or roosting sites at works areas or within the footprint of the Whole UWF Project (including within 500m of the Proposed Larger Turbines and Met Masts) where they would experience disturbance/displacement effects from construction works whilst resting on migration, with no probability of resultant effects on breeding birds or the reference population of the SPA. In relation to displacement from operating turbines (either authorised or Proposed Larger Turbines), it is considered that there is no likelihood for significant effects due to both the separation distance from the turbine locations and this SPA, and the absence of suitable breeding or foraging habitat in the vicinity of the Upperchurch Windfarm site. Wintering Golden plover were recorded infrequently and in low numbers during surveys of the UWF site, and considering the habitats within the site are sub-optimal for this specie, no significant effects are anticipated. There is no source of collision risk associated with the UWF Grid Connection or UWF Related Works (in particular no overhead wires likely to affect wildfowl). Whilst there is potential connectivity with Whole UWF Project during the operational stage with the Upperchurch Windfarm turbines (either authorised turbines or Proposed Larger Turbines), the potential/likelihood for significant effects can be excluded because any passage wildfowl will only transit over the Whole UWF Project works and there are no defined	**Screened Out** – for SPA Pathway 4

Special Conservation Interests (SCI) of the Lough River Shannon and River Fergus Estuaries SPA **Site Code: 004077**	**Notes on Special Conservation Interest**	**Potential Effect(s) On Special Conservation Interest**	**Examination of Connectivity between the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) and the River Fergus Estuaries SPA**	**Potential for significant effects?** **Yes – Screened In for further evaluation at Stage 2, or** **No – Screened out**
			feeding or roosting sites at works areas or within the footprint of the Whole UWF Project (including within 500m of the proposed Larger Turbines and Met Masts) where they would experience collision risk effects while flying. The abundance of wildfowl flying at the wind turbine blade height level will be low due to the separation distance.	

5.6 Stage One Screening Conclusion

This Screening for AA considered the effects of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project, on all European Sites and considered whether or not it can be objectively concluded that effects (if any) will not be significant in relation to European sites.

5.6.1 Results of the Screening Exercise of all 23 European Sites (17 SACs, 4 SPAs)

The Screening for AA evaluation resulted in a number of European Sites being screened out from further evaluation, and a number of European Sites being screened in for further evaluation at Stage 2 of the Appropriate Assessment Process.

5.6.1.1 European Sites screened out from further evaluation

The results are that **is there is no potential or no likelihood for the Proposed Larger Turbines and Met Masts or for the Whole UWF Project to cause any effects to the following 19 no. European Sites (16 SACs, 3 SPAs):**

- Anglesey Road SAC (002125),
- Bolingbrook Hill SAC (002124),
- Keeper Hill SAC (001197),
- Silvermine Mountain SAC (000939),
- Silvermine Mountain West SAC (002258),
- Philipston Marsh SAC (001847),
- Kilduff, Devilsbit Mountain SAC (000934),
- Glenstal Wood SAC (001432),
- Slieve Bernagh Bog SAC (002312),
- Lough Derg, North-East Shore SAC (002241),
- Glenomra Wood SAC (001013),
- Tory Hill SAC (000439),
- Ratty River Cave SAC (002316),
- Askeaton Fen Complex SAC (002279),
- Barrigone SAC (000432),
- Curraghchase Woods SAC (000174),
- Lough Derg (Shannon) SPA (004058,
- River Shannon and River Fergus Estuaries SPA (004077), and
- Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161).

Therefore, these EU sites have been 'Screened Out' at Stage One of the Appropriate Assessment process as it can be objectively concluded that effects (if any) will not be significant in relation to these 19 European Sites.

FONSE Report

In accordance with the recommendations of the Guidance Document '*Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive92/43/EEC*', (European Commission 2001), a Finding of No Significant Effects (FONSE) Report has been completed in respect of these European Sites which are screened out from further evaluation at Stage 2. The FONSE report is included as Appendix 2021 A1: Finding of No Significant Effects (FONSE) Report.

5.6.1.2 European Sites Screened In for detailed examination at Stage 2 of the AA process

The results of the screening are also that the Whole UWF Project, including the Proposed Larger Turbines and Met Masts amendment has potential, via impact pathways, to cause effects to the following 4 European Sites (3 SACs, 1 SPA);

- Lower River Shannon SAC
- Lower River Suir SAC,
- Clare Glen SAC,
- Slievefelim to Silvermines Mountain SPA

Each of the QIs/SCIs of these European Sites was screened (see Section 5.5) in order to consider whether or not it could be objectively concluded that effects (if any) will not be significant in relation to European sites. As outlined in table 5-15 below, a number of QIs/SCIs were Screened In for detailed examination at Stage 2 (Natura Impact Statement) of the Appropriate Assessment Process.

Table 5-15: European Sites, QIs/SCIs Screened In for further evaluation at Stage 2 NIS

European Site (site code)	**Qualifying Interest / Special Conservation Interest Species screened in for further consideration at Stage 2**	**Impact pathway screened in**
Lower River Suir SAC	Water courses of plain to montane levels with *the Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Alluvial Forests (91E0)* (priority habitat) Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] *Taxus baccata* woods of the British Isles [91J0] * (priority habitat) Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	**SAC Pathway 2, 3**
	Freshwater Pearl Mussel [1029] White-clawed Cravfish [1092]	**SAC Pathway 6, 8**
	Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106] Otter [1355]	**SAC Pathway 4** *(ex-situ only),* **5, 6, 7, 8**
Lower River Shannon SAC	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	**SAC Pathway 1, 2, 3**
	Alluvial Forests (91E0)* (priority habitat)	**SAC Pathway 2, 3**
	Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]	**SAC Pathway 4, 5, 6, 7, 8**
Clare Glen SAC	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Killarney Fern (*Trichomanes speciosum*) [1421]	**SAC Pathway 2, 3**
Slievefelim to Silvermines Mountain SPA	Hen Harrier [A082]	**SPA Pathway 1, 2, 3, 4**

5.6.2 Screening Conclusion

Inis Environmental Ltd. has prepared this report to inform an Appropriate Assessment screening to assess whether the Proposed Larger Turbines and Met Masts or any element of the Whole UWF Project, individually or in combination with other plans or projects, and in view of best scientific knowledge, is likely to have significant effects on any European site(s).

The screening exercise was completed in compliance with the relevant European Commission guidance, national guidance, and case law. The potential impacts of the Whole UWF Project, including the Proposed Larger Turbines and Met Masts, have been considered in the context of the European sites potentially affected, their Qualifying Interests or Special Conservation Interests and their Conservation Objectives.

Through an assessment of the source-pathway-receptor model, which considered the Zone of Influence of effects from Proposed Larger Turbines and Met Masts and from the Whole UWF Project, the following findings are reported:

- The Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, are not directly connected with, or necessary to, the management of any European site;
- The findings of the screening exercise undertaken at Stage 1 conclude that the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) is not likely to result in significant adverse effects to the Qualifying Interests and Special Conservation Interests of the following European sites:
    - Anglesey Road SAC (002125),
    - Bolingbrook Hill SAC (002124),
    - Keeper Hill SAC (001197),
    - Silvermine Mountain SAC (000939),
    - Silvermine Mountain West SAC (002258),
    - Philipston Marsh SAC (001847),
    - Kilduff, Devilsbit Mountain SAC (000934),
    - Glenstal Wood SAC (001432),
    - Slieve Bernagh Bog SAC (002312),
    - Lough Derg, North-East Shore SAC (002241),
    - Glenomra Wood SAC (001013),
    - Tory Hill SAC (000439),
    - Ratty River Cave SAC (002316),
    - Askeaton Fen Complex SAC (002279),
    - Barrigone SAC (000432),
    - Curraghchase Woods SAC (000174),
    - Lough Derg (Shannon) SPA (004058,
    - River Shannon and River Fergus Estuaries SPA (004077), and
    - Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161).

Therefore, these EU sites have been 'Screened Out' at Stage One of the Appropriate Assessment process.

Following screening to inform the requirement for Appropriate Assessment, the potential for significant effects to the Lower River Suir SAC, Lower River Shannon SAC, Clare Glen SAC and Slievefelim to Silvermines Mountain SPA cannot be excluded, as a result of the development of the UWF Grid Connection project.

Therefore, the **Lower River Suir SAC, Lower River Shannon SAC, Clare Glen SAC and Slievefelim to Silvermines Mountain SPA have been 'Screened In' for further evaluation at Stage Two of the Appropriate Assessment process.**

6 STAGE 2: APPROPRIATE ASSESSMENT

6.1 Introduction to Stage 2

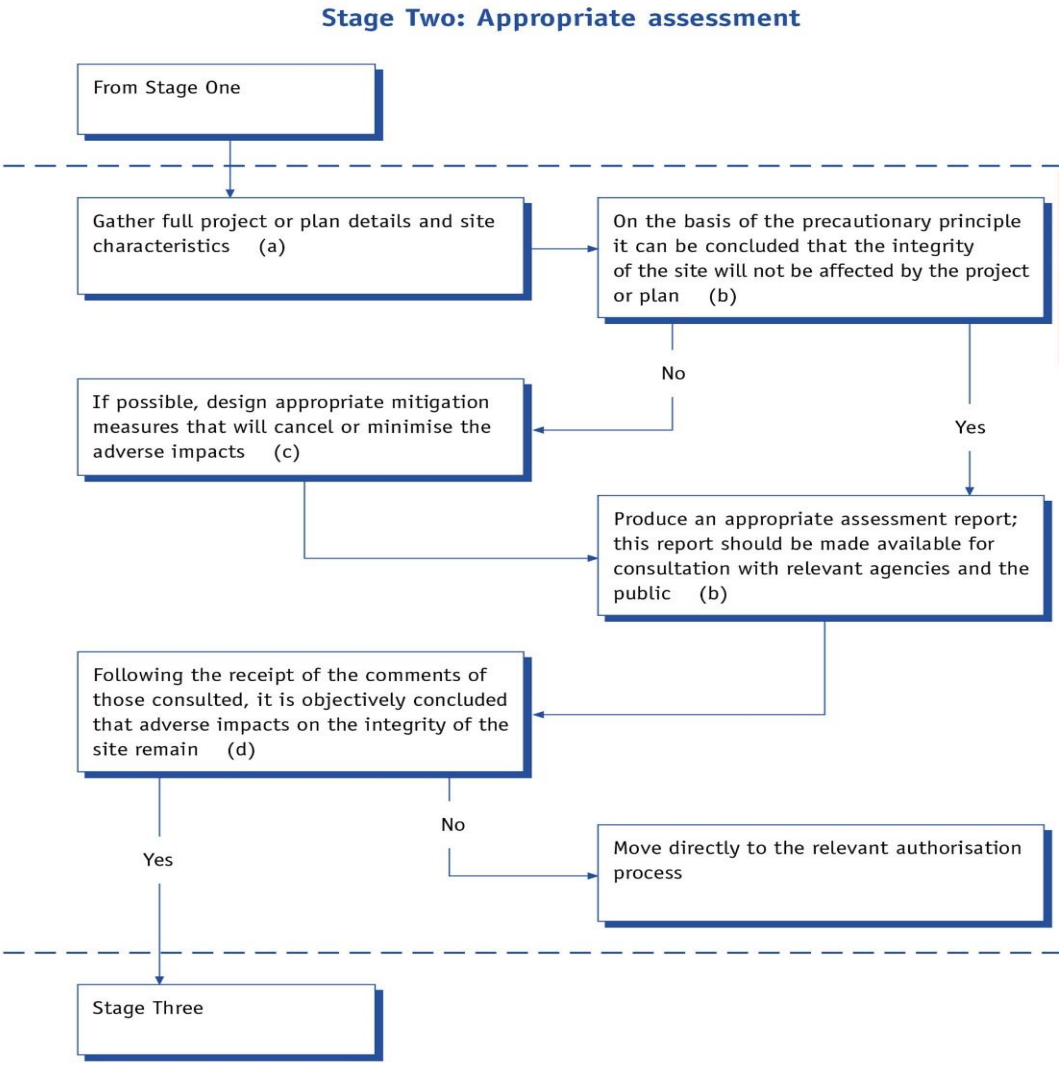
Following screening to inform the requirement for Appropriate Assessment, the potential for significant effects, could not be excluded, with regard to the following four European Sites:

1. Lower River Shannon SAC (002165)
2. Lower River Suir SAC (002137)
3. Clare Glen SAC (000930)
4. Slievefelim to Silvermines SPA (004165).

This section comprises a detailed appraisal of the impacts of the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities, on the integrity of the four European Sites, and is considered with respect to their conservation objectives and to their structure and function.

6.1.1 Appropriate Assessment Evaluation Process

The Appropriate Assessment process considers of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the Site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts. The process is illustrated below.



6.1.2 Report Authors and Sources of Information

This Appropriate Assessment Report has been prepared by Donncha O Cathain, Esther McMorrow Donnellan, and Megan Doyle with contributions from Howard Williams, of Inis Environmental Consultants Ltd and contains information which will facilitate the Competent Authority to carry out an Appropriate Assessment for the Proposed Amendment to the Authorised Upperchurch Windfarm (i.e. the Proposed Larger Turbines and Met Masts).

The preparation of this Appropriate Assessment Report has had regard to;

- EU Habitats Directive (92/43/EEC),
- EU Birds Directive (Council Directive (2009/147/EC)
- the Part XAB of the Planning and Development Act 2000,
- European Communities (Birds and Natural Habitats) Regulations 2011,
- Assessment of Plans and Projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission 2001,
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (2010).
- Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats Directive' 92/43/EEC, European Commission, 2018.

6.2 Summary of Impact Pathways screened in for examination at Stage 2

The following impact pathways to Qualifying Interests/Special Conservation Interests are examined in relation to each of the four European Sites under consideration, in order to evaluate the effect of Whole UWF Project, including the Proposed Larger Turbines and Met Masts, if any, on the integrity of each of the four European Sites.

Table 6-1: Qualifying Interests/Special Conservation Interests and Impact Pathways examined at Stage 2

European Site (site code)	**Qualifying Interest / Special Conservation Interest Species screened in for further consideration at Stage 2**	**Impact pathway and potential effects considered**
Lower River Suir SAC	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Alluvial Forests (91E0)* (priority habitat) Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] *Taxus baccata* woods of the British Isles [91J0]* (priority habitat) Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	**SAC Pathway 2, 3**
	Freshwater Pearl Mussel [1029] White-clawed Crayfish [1092]	**SAC Pathway 6, 8**
	Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106] Otter [1355]	**SAC Pathway 4** *(ex-situ only),* **5, 6, 7, 8**
Lower River Shannon SAC	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	**SAC Pathway 1, 2, 3**
	Alluvial Forests (91E0)* (priority habitat)	**SAC Pathway 2, 3**
	Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]	**SAC Pathway 4, 5, 6, 7, 8**
Clare Glen SAC	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Killarney Fern (*Trichomanes speciosum*) [1421]	**SAC Pathway 2, 3**
Slievefelim to Silvermines Mountain SPA	Hen Harrier [A082]	**SPA Pathway 1, 2, 3, 4**

The SAC Pathways and SPA Pathways are described (over).

As described at Stage 1 Screening (Section 5.4.2), the SAC Pathways 1 to 8 are:

SAC Pathway 1: Direct effects to **QI habitats** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within the SAC**

SAC Pathway 2: Indirect Effects to **QI habitats** of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **within the SAC**

SAC Pathway 3: Indirect Effects to **QI habitats**, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ***ex-situ*** the SAC

SAC Pathway 4: Direct effects to **QI species** of an SAC Site (i.e. mortality) **within or *ex-situ*** the SAC

SAC Pathway 5: Indirect efects to **QI species** of an SAC Site (i.e. disturbance /displacement) **within** the SAC

SAC Pathway 6: Indirect effects to **QI species** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within** the SAC

SAC Pathway 7: Indirect effects to **QI species** of the SAC Site (i.e. disturbance /displacement) ***ex-situ*** the SAC

SAC Pathway 8: Indirect effects to **QI species** of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ***ex-situ*** the SAC.

As described at Stage 1 Screening (Section 5.4.3), the SPA Pathways 1 to 4 are:

SPA Pathway 1: Direct disturbance or mortality effects to **SCI species within an SPA**

SPA Pathway 2: Indirect effects to **SCI species within an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species)

SPA Pathway 3: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, or through a reductions in prey item species outside their respective SPA.

SPA Pathway 4: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. disturbance or mortality effects to SCI species outside their respective SPA).

6.3 Receiving Environment

Descriptions of the Receiving Environment are provided in Section 4: Receiving Environment of this Appropriate Assessment (AA) Report 2021. Section 4 includes descriptions of Aquatic Habitats and Species, Terrestrial Habitats, Otter, Hen Harrier and General Birds in the areas at and surrounding the Upperchurch Windfarm (including the locations of the Proposed Larger Turbines and Met Masts), and the UWF Related Works, UWF Grid Connection, UWF Replacement Forestry and UWF Other Activities .

6.4 Description of the Project

6.4.1 Proposed Larger Turbines & Met Masts and the Whole UWF Project

As described in Section 2 of this AA Report 2021, the subject development, Proposed Larger Turbines and Met Masts, is a proposed amendment to the authorised Upperchurch Windfarm. The applicant, Ecopower Developments Ltd seeks to amend the size of the authorised Upperchurch Windfarm turbines to larger turbines and to amend the size and design of the authorised met masts to larger met masts which will have a lattice tower design rather than a tubular tower design.

Proposed Larger Turbines: The current proposal is to increase in the size of the authorised wind turbines from upto 126.6 meters maximum blade tip height to wind turbines upto 152 meters maximum blade tip height, by increasing the wind turbine hub heights to within a range of between 89 meters and 94 meters in height and increasing wind turbine rotor diameters to within a range of between 112 meters and 117 meters in diameter.

The proposed larger turbines will be of the same design as the authorised turbines but with longer blades and a taller hub. The proposed larger turbines will have a generation capacity in the 3.5MW to 4.2MW range. This is a considerable increase on the generation capacity of the authorised turbines (2MW to 3MW range).

The grid connection for Upperchurch Windfarm has a capacity of 94MW. As outlined in Table 6-2 below, the optimisation of the windfarm through the installation of larger turbines with greater generation capacity, can substantially fill this grid connection capacity. Also, any wind turbines proposed for connection to the National Grid must be Grid Code compliant, as is required by Eirgrid (Transmission System Operator TSO). Examples of typical turbines in the 3.5MW to 4.2MW range, which are available on the Irish market and are Grid Code Compliant, are set out in Table 6-2 below;

Table 6-2: Typical Turbines in the range

Model	Overall height to uppermost tip (m)	Hub Height	Rotor Diameter (m)	Generation Capacity (MW) per turbine	Total Generation Capacity
Vestas V117	152	93.5	117	4.2	92.4
Enercon E115	149.85	92	115.7	4.2	92.4
Nordex N117	149.5	91	117	3.6	79.2
Vestas V112	145	89	112	3.45	75.9

This application is to increase the size the authorised turbines within a specified tip height and hub height range. In the context of the constant evolution of wind turbine technology, this approach to the application will allow flexibility for the most cost-effective and efficient technology available at the time of turbine procurement, to be installed. In the recent EC Guidance on wind energy developments and EU nature legislation (Nov 2020)[18] a 'design range' approach is considered. The guidance states that compliance of a 'design range' with the Habitats Directive can be achieved by assessing the 'worst case scenario'.

Proposed Larger Met Masts: It is an Eirgrid requirement that continuous site meteorological information, independent of the wind turbines but generally at hub height, is available to the Transmission System Operator (TSO). The Authorised Upperchurch Windfarm includes 2 no. Met Masts with a height of 80m and of tubular tower design. The current proposal is to replace the 2 no. authorised 80m high tubular tower met masts with maximum in height, 93.5m lattice tower masts. See Drawing of Meteorological Mast UWF-PA1-07 in the Drawing Pack accompanying this planning application. There will be no change in location of the met masts. The proposed larger met masts will be installed at the same locations as the authorised 80m masts.

6.4.2 Elements of the Whole UWF Project

The Proposed Larger Turbines and Met Masts amendment will form part of the Upperchurch Windfarm development, which in turn in part of a larger whole project – the Whole Upperchurch Windfarm (UWF) Project.

Upperchurch Windfarm as a whole project (Whole UWF Project) includes the following elements:

1. Authorised Upperchurch Windfarm[19];
2. This amendment to the authorised windfarm – Proposed Larger Turbines and Met Masts;
3. UWF Related Works;
4. UWF Grid Connection;
5. UWF Replacement Forestry; and
6. UWF Other Activities.

See AA 2021 Figure 1: Location of the Whole Upperchurch Windfarm (UWF) Project

The various Elements of the Whole UWF Project, including the Proposed Larger Turbines and Met Masts, are described in Sections 2.1 to 2.7 of this AA Report 2021.

[18] Commission notice Guidance document on wind energy developments and EU nature legislation Brussels, 18.11.2020 C(2020) 7730 final – Section 3.5 Dealing with uncertainty in assessing and authorising wind energy development

[19] The Authorised Upperchurch Windfarm includes amendments to the Upperchurch Windfarm substation which were authorised in December 2020 (Tipperary County Council Ref: 20/1048). The authorised amendments to the substation were subject to Habitats Directive Assessment Screening by Tipperary County Council (November 2020) which concluded that there was no potential for the substation amendment to cause significant effects to European Sites.

6.4.3 Other Unrelated Projects and Activities (considered for in-combination effects)

Other unrelated projects and activities, which are considered for in-combination effects with the Whole UWF Project are described in Section 2.8.

Each of the Other Unrelated Projects and Activities described at Section 2.8 were scoped to determine whether these projects had potential to cause in-combination effects to each of the 3 SAC and 1 SPA sites. The results are outlined in Table 6-3. See Appendix 2021 A2: Scoping of Other Projects and Activities for further details on the scoping of the projects.

Table 6-3: Scoping of Other Projects in Relation to the European Sites

European Site	Unrelated Project or Activity scoped in for evaluation of in-combination effects
Lower River Shannon SAC	• Rearcross Quarry • Castlewaller Windfarm • Bunkimalta Windfarm • Agriculture, Forestry and Turf-cutting in the surrounding area
Lower River Suir SAC	• Agriculture, Forestry and Turf-cutting in the surrounding area
Clare Glen SAC	• Rearcross Quarry • Castlewaller Windfarm • Bunkimalta Windfarm • Agriculture, Forestry and Turf-cutting in the surrounding area
Slievefelim to Silvermines Mountain SPA	• Rearcross Quarry • Castlewaller Windfarm • Bunkimalta Windfarm • Milestone Windfarm • Agriculture, Forestry and Turf-cutting in the surrounding area

6.5 Mitigation Measures

As there is potential for significant effects, the mitigation measures which will avoid the impact, or reduce the significance of impact, are described hereunder.

6.5.1 Mitigation Measures to avoid or reduce effects via SAC Pathways 1 to 8

As described at Stage 1 Screening (Section 5.4.2), the SAC Pathways 1 to 8 are:

SAC Pathway 1: Direct effects to **QI habitats** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within the SAC**

SAC Pathway 2: Indirect Effects to **QI habitats** of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **within the SAC**

SAC Pathway 3: Indirect Effects to **QI habitats**, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ***ex-situ*** the SAC

SAC Pathway 4: Direct effects to **QI species** of an SAC Site (i.e. mortality) **within or *ex-situ*** the SAC

SAC Pathway 5: Indirect effects to **QI species** of an SAC Site (i.e. disturbance /displacement) **within** the SAC

SAC Pathway 6: Indirect effects to **QI species** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within** the SAC

SAC Pathway 7: Indirect effects to **QI species** of the SAC Site (i.e. disturbance /displacement) ***ex-situ*** the SAC

SAC Pathway 8: Indirect effects to **QI species** of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ***ex-situ*** the SAC.

The mitigation measures detailed in Tables 6-3 to 6-7 (over) relate to Upperchurch Windfarm, UWF Related Works, UWF Grid Connection, UWF Replacement Forestry and UWF Other Activities and will be implemented during the development of the Whole UWF Project.

No changes to these mitigation measures and no additional measures are required for the Proposed Larger Turbines and Met Masts for the protection of European Sites..

6.5.1.1 Mitigation Measures, Management Plans, Emergency Procedures & Best Practice Measures

Table 6-4: Upperchurch Windfarm Mitigation Measures to avoid/ reduce effects via SAC Pathways 1 to 8

Relevant Planning Conditions to ensure mitigation implementation	
WF-MM-22	A suitably qualified ecologist will be engaged to oversee the Ecological Management Plan over the life time of the wind farm. All site actions and monitoring measures will be required to be undertaken by the developer and under the supervision of the ecologist to achieve the objectives of the plan.
Condition 2	All environmental mitigation measures set out in the Environmental Impact Statement, Natura Impact Statement and associated documentation submitted by the applicant to the planning authority and An Bord Pleanála, shall be implemented in full, except as may otherwise be required in order to comply with the planning conditions.
Condition 10	The proposed construction works on the site shall be carried out in accordance with construction details submitted to the planning authority on the 7th day of January, 2013 and as further amended on the 27th day of November, 2013, including the Construction Management Plan, and the mitigation measures contained therein.
Condition 18(a)	The Ecological Management Plan submitted to the planning authority on the 27th day of November, 2013, shall be implemented in full.
Upperchurch Windfarm Mitigation Measures (WF-MM) which will avoid/reduce effects via SAC Pathways 1 to 8	
WF-MM-01	With exception of one stream crossing (250m to north of T4), no roads or turbine foundations occur within 50m of a watercourse. The stream crossing method statement will be designed in consultation with Inland Fisheries Ireland – South Eastern River Basin District and Shannon River Basin District prior to initiation of construction works
WF-MM-02	Where construction activities intercept the 50m hydrological buffer zone, the following mitigation will used to prevent any potential impacts: • Construction activities in the hydrological buffer zones will be avoided during or after prolonged rainfall or an exceptional rainfall event. Work will cease entirely near watercourses when it is evident that pollution is likely to occur. • Culverts will be installed at locations where land drains are intercepted and will be diverted into the clean water drains. The culverts will be designed to facilitate the large flows that may occur following intense or prolonged rainfall events.
WF-MM-03	Limestone or similar quality stone will be used to cap the new access road network and the upgraded existing roads.
WF-MM-04	All associated tree felling will be undertaken using good working practices as outlined by the Forest Service in their 'Forestry Harvesting and Environment Guidelines' (2000) and the 'Forestry and Water Quality Guidelines ' (2000). Measures will include the protection of the riparian zones, installation of buffered drainage outfalls, installation of drains and silt traps as soon as possible once felling has been completed, and a regime of continued monitoring of silt traps and drainage outfalls will be implemented. All excess felled brash will be removed off site to avoid release and runoff of phosphorous into sensitive watercourses.
WF-MM-05	No construction activities will take place during or after prolonged rainfall or an exceptional rainfall event.
WF-MM-06	Culverts will be installed at locations where land drains are intercepted and designed to facilitate the large flows associated with intense or prolonged rainfall events.
WF-MM-07	Method statements for stream crossing, culverts and drainage will be developed in consultation with Inland Fisheries Ireland prior to initiation of construction works.
WF-MM-08	A continuous silt fence will be installed down slope from the works area where construction shall take place within 100m of a watercourse. This will act as a physical impediment to any material or run-off reaching the stream and will be installed prior to the commencement of site excavations for each section. Effective and adequate temporary silt fences will be erected on the watercourse side to trap

	sediment particles when work is taking place during a prolonged wet weather period or intense rainfall event. The silt fences will be inspected regularly to ensure that the integrity of the structure remains intact and fit for purpose throughout the construction phase of the proposal.
WF-MM-09	During the construction phase, excavations will be backfilled as soon as is possible to prevent any infiltration of potentially polluting compounds to the subsurface.
WF-MM-10	Any water ingress that may be encountered in the weathered bedrock / mineral subsoils during the construction phase will be intercepted by an interceptor drain and diverted to the constructed drainage system for pollution control attenuation prior to discharge. Any pumping or dewatering of excavations or the drainage system will be well planned and pumped water will be treated in the adequate settlement pond and silt trap. No freshly pumped water will be permitted to enter the existing drainage network directly or be pumped out onto adjacent habitat.
WF-MM-11	A Concrete Control Procedure will be implemented, and will include the following measures: • Trucks that deliver concrete to site will be washed out at the supplier's facilities and not on site. • The only cement washing that will need to occur on site is the hand washing of the chutes at the rear of the cement trucks after the cement has been deposited. • A concrete washout area will be designated away from drains and watercourses for washing out the chutes; • A designated trained operator experienced in working with concrete will be employed during the concrete pouring phase; • Run-off from wind turbine foundation concrete pours shall not be permitted to enter the watercourses and shall be contained within the foundation excavations and designated areas that are suitably sited and designed; • Large volumes of concrete water will be pumped into a skip to settle out; settled solids will be appropriately disposed of off-site. The total volume will be reduced by only permitting concrete chutes to be washed on site. • Raw or uncured waste concrete / cementitious material will be disposed of by removal from the site; • The amount of in-situ concreting required will be minimised and ready-mix suppliers will be used in preference to on-site batching;
WF-MM-12	A wheel wash area will be provided and the resultant waste water will be diverted to a siltation pond for settling out of solids.
WF-MM-13	During the construction phase, a self-contained portable toilet with an integrated waste holding tank will be used on site for toilet facilities. This will be maintained by the service contractor on a regular basis and will be removed from the site on completion of the construction phase.
WF-MM-14	Any introduced semi-natural (road building materials) or artificial (PVC piping, cement materials, electrical wiring etc.) will be taken off site at the end of the construction phase. Any accidental spillage of solid state introduced materials will be removed from the site.
WF-MM-15	Temporary facilities will be provided on the proposed site for construction traffic parking, temporary site offices and storage areas
WF-MM-16	Materials, containers, stockpiles and waste, however temporary, will be stored at designated areas, as follows: • Away from drains and any watercourses or drains; • Fuel oils etc. will be stored in a sheltered area well removed from aquatic zones Under cover to prevent damage from the elements • In secure areas • Well away from moving plant, machinery and vehicles • All containers will be stored upright and clearly labelled.

WF-MM-17	During the construction phase, excavation of the soils in the localised area around the turbine locations and new access roads will be kept to a minimum, to ensure minimal disturbance of the natural soil conditions.
WF-MM-18	All excavated earth materials will be either re-used in an environmentally appropriate and safe manner, e.g. used for landscaping, or removed from the development site at the end of the construction phase.
WF-MM-19	Drains will be established to effectively drain grounds prior to excavation or earthworks of each section of road. Such drains will be positioned at an oblique angle to slope contours to ensure ground stability;
WF-MM-20	All site excavations and construction will be supervised by a suitably qualified engineer. The contractor's method statement will be reviewed and approved by a suitably qualified geotechnical engineer prior to site operations.
WF-MM-21	Vehicular movements will be restricted to the footprint of the development. This implies that machinery will be kept on the site roads and hardstanding areas and aside, from advancing excavations, avoid moving onto areas not delineated on the site drawing.
WF-MM-24	The layout of the Upperchurch Windfarm has been designed to ensure that there is a sufficient buffer between windfarm infrastructure and the natural watercourses and streams within the study area. The layout of the turbines and the route of the access roads was also based on the results of site investigations, and for the most part the turbines and roads have been located on the least ecologically sensitive areas found during the investigations.
Specific Management Plans which include measures designed to or which will in part avoid/reduce effects via SAC Pathways 1 to 8	
WF-PLAN	Construction Environmental Management Plan (CEMP)
WF-PLAN	Sediment & Erosion Storm Water Control Plan
WF-PLAN	Fuel and Oil Management Plan
WF-PLAN	Surface Water Management Plan
Environmental Emergency Response Procedures included in the Upperchurch Windfarm CEMP	
WF-PLAN	Environmental Emergency Response Plan • Release of hazardous substance - Fuel or oil spill • Concrete spill or release of concrete • Flood event – extreme rainfall event • Environmental buffers and exclusion zones breach • Housekeeping of materials and waste storage areas breach • Stop works order due to environmental issue or concern (threat to archaeological or ecological feature) • Fire on site (cross-reference site Safety Emergency Plan as appropriate)

Table 6-5: UWF Related Works Mitigation Measures to avoid/ reduce effects via SAC Pathways 1 to 8

Monitoring to ensure mitigation implementation	
RW-EMP Section 7.1.1	The Environmental Clerk of Works will monitor the compliance of the construction works with the EMP, and will engage specialist environmental consultants, such as ecologists, hydrologists and archaeologists, as required.
UWF Related Works Project Design Environmental Protection Measure (RW-PD)which will avoid/reduce effects via SAC Pathways 1 to 8	
RW-PD01	All construction works will be carried out during daylight hours.
RW-PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
RW-PD09	New permanent access roads (Realigned Windfarm Roads) will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
RW-PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
RW-PD11	Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. 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 margin to stabilise banks, add flood protection and provide riparian buffer.
RW-PD12	A phased approach will be undertaken in relation to watercourse crossing works, earthworks, forestry felling and excavation dewatering, where these works occur within 50m of a Class 1 or Class 2 watercourse. The phased approach will only permit one of main potential sediment producing activities, listed above, to be carried out within 50m of a Class 1 or Class 2 watercourse, at any one time.
RW-PD13	All excavated material will be removed for temporary or permanent storage at a suitable location more than 50m away from all other Class 1 and Class 2 watercourses.
RW-PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
RW-PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.
RW-PD16	For works within 50m of a Class 1 or Class 2 watercourse, 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.
RW-PD17	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated 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.
RW-PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse
RW-PD19	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 (Consented Upperchurch Windfarm Site Compound No.1). All fuel will be stored in bunded, locked storage containers.
RW-PD20	Overnight parking of plant and machinery will only be permitted at locations which are greater than 50m from watercourses and where there is an existing hard-core surface in place.
RW-PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells
RW-PD22	In-stream works at Class 1 and Class 2 watercourses will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
RW-PD23	In-stream works will not be undertaken without isolation of flow within the watercourse, any fish within the isolated section will be removed 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, flume (pipe) or channel diversion methods.

RW-PD24	All new permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be a minimum of 900mm in diameter regardless of the anticipated flood flow.
RW-PD25	All new permanent culverts in Class 1 and Class 2 type watercourses will be bottomless or clear spanning.
RW-PD29	Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.
RW-PD30	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/outside of 1 hours after sunrise or before sunset during winter.
RW-PD31	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 cubs are present in the holt and NPWS will be notified immediately
RW-PD32	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 or scrub clearance will not take place within 15m of such holts, except under license.
RW-PD33	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) 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.
Specific Management Plans which include measures designed to or which will in part avoid/reduce effects via SAC Pathways 1 to 8	
RW-PLAN	Surface Water Management Plan (SWMP)
RW -PLAN	Invasive Species Management Plan (ISMP)
Environmental Emergency Response Procedures included in the UWF Grid Connection Environmental Management Plan	
RW-ERP-01	Oil/Fuel Spillage
RW-ERP-02	Significant pollution occurrence in local surface waters
Best Practice Measures which include measures which will in part avoid/reduce effects via SAC Pathways 1 to 8	
RW-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
RW-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
RW-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
RW-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
RW-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
RW-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
RW-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
RW-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
RW-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden
RW-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden
RW-BPM-16	Monitoring of non-native invasive plant species
RW-BPM-17	Best practice measures for the removal of vegetation during construction
RW-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).
RW-BPM-22	Management of general non-native invasive species

Table 6-6: Mitigation Measures for UWF Grid Connection to avoid or reduce effects via SAC Pathways 1 to 8

Monitoring Measure to ensure mitigation implementation	
GC-PD-46	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 Appendix A10 in Reference Document 25 of 36).
UWF Grid Connection Project Design Environmental Protection Measure (GC-PD) which will avoid/reduce effects via SAC Pathways 1 to 8	
GC-PD-04	All construction works will be carried out during daylight hours
GC-PD-05	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.
GC-PD-17	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.
GC-PD-18	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.
GC-PD-19	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.
GC-PD-20	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.
GC-PD-21	At Mountphilips Substation site, permanent storage berms around the substation compound will be sown with grasses and flower species common to the surrounding vegetation. The permanent storage berms along the new access road will be planted with local provenance native fruiting hedge species, with grasses and native flower species sown along the sides of the berms. Revegetation works will take place at the soonest practicable opportunity after emplacement.
GC-PD-22	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.
GC-PD-23	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.
GC-PD-24	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.
GC-PD-25	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 weather forecasting will be undertaken in advance of works.
GC-PD-26	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.
GC-PD-27	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.
GC-PD-28	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.
GC-PD-29	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.
GC-PD-30	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.
GC-PD-31	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.
GC-PD-32	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.
GC-PD-33	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.
GC-PD-34	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.
GC-PD-35	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.
GC-PD-42	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.
GC-PD-43	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.
GC-PD-44	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.
GC-PD-45	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 Appendix A10 in Reference Document 25 of 36).
GC-PD-47	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 Appendix A10 in Reference Document 25 of 36).
GC-PD-48	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.
GC-PD-49	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).
GC-PD-50	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.
GC-PD-51	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.
GC-PD-52	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.
GC-PD-53	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.
GC-PD-54	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
GC-PD-55	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.
GC-PD-56	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.
GC-PD-69	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.
Specific Management Plans which include measures designed to or which will in part avoid/reduce effects via SAC Pathways 1 to 8	
GC-PLAN	Surface Water Management Plan (SWMP)
GC-PLAN	Invasive Species Management Plan (ISMP)
Environmental Emergency Response Procedures included in the UWF Grid Connection Environmental Management Plan	
GC-ERP-01	Oil/Fuel Spillage
GC-ERP-02	Significant Pollution Occurrence in Local Surface Waters

GC-ERP-03	Frac-Out during Drilling Works at W8 or W9
Best Practice Measures which include measures which will in part avoid/reduce effects via SAC Pathways 1 to 8	
GC-BPM-01	Best Practice Measures for Protection of Surface Water Quality and Watercourse Morphology during instream works at Mountphilips Substation site
GC-BPM-02	Best Practice Measures for Protection of Surface Water Quality and Watercourse Morphology during replacement of existing culverts along the 110kV UGC outside Mountphilips Substation site
GC-BPM-03	Best Practice Design of New Permanent Watercourse Crossing Structures and Existing Culvert Replacements to Prevent Flood Risk
GC-BPM-04	Best Practice Surface Water Quality Protection Measures for Site Runoff during the Mountphilips Substation Site Construction Works
GC-BPM-05	Best Practice Measures to Protect Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-06	Best Practice Measures to Protect Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-07	Best Practice Measures to Protect Surface Water Quality During Storage of Overburden at the Mountphilips Substation Site
GC-BPM-08	Best Practice Measures for Minimising Dust Emissions from Site Activities

Table 6-7: Mitigation Measures for UWF Replacement Forestry to avoid or reduce effects via SAC Pathways 1 to 8

Monitoring to ensure mitigation implementation	
RF-EIAR Section 5.2.4.3	An Environmental Clerk of Works will be employed during the planting stage to monitor the implementation of the environmental protection measures.
UWF Replacement Forestry Project Design Environmental Protection Measure (RF-PD) which will in part avoid/reduce effects via SAC Pathways 1 to 8	
RF-PD-01	All planting and maintenance activities will be carried out during daylight hours
RF-PD-02	The lands will be planted by hand, using spades and hand tools.
RF-PD-03	No pesticide or fertilizer will be used at the UWF Replacement Forestry site.
RF-PD-04	There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the site.
RF-PD-05	A water setback from the watercourse which flows through the site will be established during planting works. The setback will be 10m from the edge of the watercourse. No planting or other works will be carried out in this 10m wide buffer area. Native woodland will be planted beyond this distance in accordance with Silvicultural Standards for Native Woodland Establishment GP9 & GP10 (Department of Agriculture, Food and the Marine, 2015).
RF-PD-08	Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.
RF-PD-09	All planting 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/outside of 1 hours after sunrise or before sunset during winter.
RF-PD-10	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 cubs are present in the holt* and NPWS will be notified immediately
RF-PD-11	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 or scrub clearance will not take place within 15m of such holts, except under license.
RF-PD-12	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) 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.
Specific Management Plans which include measures designed to or which will in part avoid/reduce effects via SAC Pathways 1 to 8	
RF-PLAN	Invasive Species Management Plan (ISMP)
Best Practice Measures which include measures which will in part avoid/reduce effects via SAC Pathways 1 to 8	
RF-BPM-01	Monitoring of non-native invasive plant species
RF-BPM-02	Management of general non-native invasive species

Table 6-8: Mitigation Measures for UWF Other Activities to avoid or reduce effects via SAC Pathways 1 to 8

Monitoring to ensure mitigation implementation	
EMP 2021 EMP 2019 EMP 2019	The environmental protection measures for UWF Other Activities will be implemented as part of the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm and will be incorporated into their respective Environ-mental Management Plans. For example, measures listed above which are relevant to Overhead Line Activities will be monitored through the UWF Grid Connection Environmental Management Plan
UWF Other Activities Environmental Protection Measure (OA-PD) which will in part avoid/reduce effects via SAC Pathways 1 to 8.	
OA-PD-03	In order to protect water quality, Overhead Line Activities, Haul Route Activities and Upperchurch Hen Harrier Scheme activities which occur within 50m of a watercourse will be carried out during a dry spell of weather; a minimum buffer of 5m will be maintained between the activity and the watercourse where possible; straw bales will be placed between the activity location and the watercourse if there is a risk of sediment runoff from the activity (such as tree planting); all machinery or equipment used will be steam-cleaned before use at the location and checked for oil leaks prior to use; no refuelling of machinery or equipment will take place with 100m of a watercourse; access matting such as bog mats will be used in wet/boggy areas to provide access to vehicles, and any ground rutted by vehicles associated with UWF Other Activities will be repaired through loosening the compacted soil under any ruts with fork; any disturbed ground will be re-seeded immediately following the completion of the activity at a location.
OA-PD-04	Invasive Species monitoring in the form of confirmatory surveys will be carried out during the construction stage of the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm to identify any infestations within or close to the relevant UWF Other Activity locations. Surveys will focus always on the activity location plus 7m and will be carried out ahead of any activities taking place. The measures included in the Invasive Species Management Plan for UWF Grid Connection and UWF Related Works will be implemented – See Volume D of the planning applications for these Elements in Reference Document 23 of 36 and Reference Document 12 of 36.
OA-PD-05	In order to avoid the spread of invasive species, any infestation of invasive species will be dealt with, throughout the construction stage, with comprehensive Best Practice measures as outlined in the Invasive Species Management Plan of the UWF Grid Connection Environmental Management Plan 2019 (Reference Document 23 of 36). The Promoter of the Whole UWF Project, Ecopower Developments Ltd, will have full control over all construction practices for the works as the Promoter. Ecopower Developments is committed to implementing the Biosecurity Measures, which are described in the Invasive Species Management Plan, for all works and activities relating to the Whole UWF Project. These measures will also apply to any UWF Other Activities carried out during the operational or decommissioning stages.

6.5.1.2 Effectiveness of these measures

The Mitigation Measures (Project Design Measures, Management Plans, Environmental Emergency Response Measures and Best Practice Measures), listed in Section 6.5.1.1 above, have been developed by the hydrological/drainage and ecological expert members of the Project Design team in consultation with Inland Fisheries Ireland and use best practice water quality protection techniques which are tried and tested regularly across the country. Furthermore, an Environmental Clerk of Works will be employed during the construction stage to monitor the effectiveness of these measures on a daily basis. The watercourse crossing, drainage and water quality measures have been developed using relevant legislation, guidance and literature including:

Watercourse crossing works and aquatic habitat protection guidance

- Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters;
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes;
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board.
- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.
- EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems.
- National Roads Authority. Guidelines for the treatment of Otters prior to the construction of National Road Schemes.

Pollution Prevention Guidance Notes (PPGs):

- PPG01 General guide to the prevention of water pollution;
- PPG02 Above ground oil storage tanks;
- PPG05 Works in near or liable to affect watercourses;
- PPG06 Working at construction and demolition sites;
- PPG07 Refuelling Facilities;
- PPG11 Preventing pollution at industrial sites;
- PPG18 Control of spillages and firefighting run-off;
- PPG20 Dewatering underground ducts and chambers;
- PPG21 Pollution Incident Response Planning;
- PPG23 Maintenance of Structures over Water; and,
- PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers.

Construction Industry Research and Information Association (CIRIA):

- CIRIA Report C502 Environmental Good Practice on Site;
- CIRIA Report C532 Control of Water Pollution from Construction Sites;
- CIRIA Report C648 Control of Pollution from Linear Construction Project; Technical Guidance;
- CIRIA Handbook C650 Environmental good practice on site;
- CIRIA Handbook C651 Environmental good practice on site checklist;
- CIRIA Report C609 - SuDS – hydraulic, structural & water quality advice; and,
- CIRIA Report C697 – The SuDS Manual.

Invasive Species Guidance

- Managing Japanese knotweed on development sites - The Knotweed Code of Practice produced by the Environmental Agency (2013);
- NRA Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2010);
- Managing Invasive Non-native Plants in or near Freshwater, Environment Agency (2010);
- Best Practice Management Guidelines Japanese knotweed Fallopia japonica, Invasive Species Ireland (2015);
- IFI Biosecurity Protocol for Field Survey Work, Inland Fisheries Ireland (2010).

6.5.1.3 Implementation of the Mitigation Measures

The Mitigation Measures (Project Design measures, Management Plans, Environmental Emergency Procedures and Best Practice Measures) will be implemented by the Project Manager and the main Contractors during the construction stage. Implementation of the Mitigation Measures, will be implemented through Environmental Management Plans (EMPs) – i.e. Upperchurch Windfarm nvironmental Management Plan 2021 (Updated to Include the Proposed Larger Turbines & Met Masts), the UWF Related Works Environmental Management Plan (2019), and the UWF Grid Connection Environmental Management Plan (2019).

The EMPs will be an important contract document for the two main construction contractors (Contractors) (i) for the Upperchurch Windfarm (including UWF Related Works) and (ii) for UWF Grid Connection. The Contractors will be contractually obliged to comply with the EMP. An Environmental Clerk of Works will be appointed, who will be independent of the construction Contractors, and it will be the responsibility of the Environmental Clerk of Works to monitor the compliance of the Contractors with the EMPs through liaising with the Construction Site Managers and the Project Managers, monitoring construction works on a daily basis and by carrying out regular audits on EMP compliance. The Environmental Clerk of Works will be resourced to employ a team of environmental specialists including a Site Ecologist, Site Hydrologist and an Invasive Species Specialist. The Contractors will be contractually obliged to comply with the requirements of the Environmental Clerk of Works to ensure that the EMPs are implemented.

6.5.1.4 Degree of confidence in the likely success of the mitigation measures

All protection measures have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. As such there is a very high degree of confidence in their likely success.

6.5.1.5 Monitoring of the Implementation and Effectiveness of the Mitigation Measures

Monitoring measures are the procedures to keep under systematic review the adverse effects on the environment resulting from the construction and operation of a Project, and to identify unforeseen significant adverse effects, in order to be able to undertake appropriate remedial action.

Monitoring arrangements will involve an Environmental Clerk of Works team, monitoring the implementation of a suite of environmental protection measures, i.e. Mitigation Measures (Project Design Measures, Management Plans and Best Practice Measures) which have been developed to avoid, prevent or reduce adverse effects on the receiving environment and the European Sites located therein. These measures are incorporated into the Upperchurch Windfarm nvironmental Management Plan 2021 (Updated to Include the Proposed Larger Turbines & Met Masts), the UWF Related Works Environmental Management Plan, and the UWF Grid Connection Environmental Management Plan. Some monitoring measures come from Mitigaiton Measures, some from Project Design Measures (PDs), some come from the Surface Water Management Plan (SWMP) or Invasive Species Management Plan (ISMP), and some come from Best Practice Measures (BPMs).

All watercourse crossings occur within or upstream of salmonid watercourses. In order to demonstrate compliance with and effectiveness of the prescribed mitigation, it is proposed to carry out construction phase monitoring of watercourse crossing works, and of water quality upstream and downstream of the crossing locations. The measures are based on standard guidance; however, ongoing monitoring during the works will provide proactive adjustments in line with prevailing conditions.

With regard to water quality monitoring, both suspended solids (TSS) and turbidity will be monitored upstream and downstream of at each watercourse crossing during works. Suspended solids analysis will be

carried out in an approved laboratory and data cannot be obtained in real-time. Turbidity probes provide real-time data on site and can be used to indicate a comparison of the suspended silt fraction in the water column upstream and downstream. Both TSS and turbidity sampling will be completed in-situ both upstream and downstream of all watercourse crossings (other than drains) immediately before works commence and then during and after to manage compliance with water quality standards. It is recognised that TSS and turbidity fluctuate naturally within the aquatic environment based on seasonal and sporadic flow events.

Surface water quality standards for TSS are not specified in the Surface Water Regulations (2009); however, limit levels or trigger values will be defined for both TSS and turbidity based on the pre-construction monitoring results. With reference to the minor headwater streams within the Clodiagh Freshwater pearl mussel catchments, strict adherence to water quality protection measures will ensure compliance with water quality standards, in the downstream monitoring locations specified in the SWMP.

Table 6-9: SWMP, ISMP, BPM monitoring measures

Surface Water Management Plan Monitoring Measures
Drainage Inspections at the Upperchurch Windfarm and Mountphilips Substation sites The following periodic inspection regime will be implemented, and inspections recorded: • Daily general visual inspections by Environmental Clerk of Works; • Weekly (existing & new drains) inspections by site Construction Manager; • Inspections will include all elements of drainage systems; • Inspections will ensure that drainage systems are operating correctly and will identify any maintenance that is required; • Any changes, such as discolouration, odour, oily sheen or litter will be noted and corrective action will be implemented immediately. • High risk locations such as settlement ponds will be inspected on a daily basis by the Construction Manager; • Daily inspections checks will be completed on plant and equipment, and whether materials such as straw bales or oil absorbent materials need replacement; • Event based inspections by the Environmental Clerk of Works as follows: o >10 mm/hr (*i.e.* high intensity localised rainfall event); o >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or, o Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week). Weekly, Fortnightly and Monthly (depending on weather conditions and the nature of on-going construction works) site inspections by the Project Hydrologist during construction phase
Water Quality Monitoring • Daily field monitoring of water quality parameters and collection of samples will be undertaken by the Environmental Clerk of Works. He/she will be appropriately trained on the required monitoring methods and the use, calibration and maintenance of all monitoring equipment used. • Regular (i.e. weekly or fortnightly depending on weather conditions) field monitoring will be carried out by the Project Hydrologist. • Surface water quality will be monitored during the construction phase and this monitoring will also extend into the post construction phase. Proposed monitoring locations downstream of the works areas. The locations of the surface water monitoring points will be agreed with Inland Fisheries Ireland and Tipperary County Council in advance of the construction phase. Laboratory analysis of water samples will also be undertaken as part of the monitoring programme by an independent and appropriately certified laboratory.

Frequency of Water Quality Monitoring

- Daily visual checks at watercourse crossing locations where works are taking place;
- Weekly sampling for suspended solids and turbidity in catchments where earthworks or watercourse crossing work is on-going;
- Fortnightly sampling for the full suite of parameters in catchments where works are on-going;
- Event based sampling, e.g. after heavy rainfall;
- Additional sampling in the event of trigger level exceedance, after heavy rainfall, etc; and,

Post construction sampling programme (monthly sampling) for a period of six months

- Pre-Construction confirmatory surveys will be completed by an invasive species specialist, 3 – 4 weeks before construction begins. Mapping, showing the most up to date distribution and extent of each infestation, will be distributed to the Client, Owners Engineer and the Contractor;
- The covering of vegetative knotweed infestations with high density polyethylene grass carpet terram at all identified locations prior to any works commencing on that section and the monitoring of construction works at that section when it happens;
- To ensure the effective implementation of the biosecurity measures, an invasive species specialist will monitor each infestation location during all critical stages of construction works;

Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and which has come into contact with water or soils) for evidence of attached plant or animal material, or adherent mud or debris.

Invasive Species Management Plan Monitoring Measures

Pre-Construction confirmatory surveys will be completed by an invasive species specialist, 3 – 4 weeks before construction begins. Mapping, showing the most up to date distribution and extent of each infestation, will be distributed to the Client, Owners Engineer and the Contractor;

During the operational phase: Before planned maintenance or unplanned repair works commence, an ecology or invasive species specialist will survey the works locations for invasive plant species infestations in proximity to the works location(s), … the ecologist/invasive species specialist will supervise any works in proximity (5m) to infestations to ensure that construction machinery and operatives do not come into contact with these infestations;

Best Practice Monitoring Measures

The Construction Manager will be responsible for monitoring weather conditions

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

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. The surface water monitoring locations and sampling programme are defined in the Surface Water Management Plans

Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase

All permanent overburden storages areas will be checked / monitored daily until stabilised to ensure no drainage issues of surface water quality impacts are occurring

Table 6-10: Monitoring Measures and Procedures for UWF Grid Connection (specific to Lower River Shannon SAC)

Project Design (PD) Monitoring Measures (PD32, PD41, PD45, PD46, PD47)
GC-PD-32: 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.
GC-PD-45: The horizontal directional drilling works at W8 and W9 will be supervised and managed by a competent and experienced Mud Engineer who understands the technicalities and challenges of drilling works. The Mud Engineer will monitor the watercourse bed during drilling works, and will supervise the drilling works including the drilling pressures and the implementation of any contingency measures.
GC-PD-46: 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 Environmental Management Plan for UWF Grid Connection (see Appendix A10 in Reference Document 25 of 36).
GC-PD-47: 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. The surface water monitoring locations and sampling programme are defined in the Surface Water Management Plan for UWF Grid Connection.

6.5.1.6 How any mitigation failure will be addressed

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

The Mitigation Measures will be implemented by the Project Manager and the main Contractor during the construction stage. Implementation of the measures, including the Management Plans, will be carried out under Environmental Management Plans for the Upperchurch Windfarm (Upperchurch Windfarm nvironmental Management Plan 2021 (Updated to Include the Proposed Larger Turbines & Met Masts), for UWF Related Works, and for the UWF Grid Connection.

The Environmental Management Plans include a supervisory structure which ensures accountability for all works elements, with requirements for a Project Manager and an independent (of the Contractor) Environmental Clerk of Works along with suitably qualified specialists (including Site Ecologist; Site Hydrologist, mud engineer and invasive species specialist) who will supervise the works and monitor the implementation of Mitigation Measures in order to ensure that sensitive works elements are carried out in a manner which delivers the planned outcomes within the parameters of the impact assessment, as specified.

On this basis, it can be confidently concluded that failures in the mitigation measures and their prescribed outcomes will be avoided.

Nonetheless, the EMPs include contingency measures for unforeseen events, such as oil/fuel spillages, frac-out or water pollution. The Environmental Clerk of Works will have a full-time presence on-site during the construction stage, and environmental experts will supervise works at environmentally sensitive locations. This will ensure that any unforeseen significant adverse effects are identified in a timely manner and appropriate remedial action taken immediately. The Environmental Clerk of Works will have a 'stop-works' authority to temporarily stop works over part of the site to avoid either an infringement of the Environmental Commitments or an unforeseen adverse environmental event. Works will not be allowed to re-commence until the issue is resolved.

6.5.2 Mitigation Measures to avoid or reduce effects via SPA Pathways 1 to 4 (hen harrier and supporting species)

As described at Stage 1 Screening (Section 5.4.3), the SPA Pathways 1 to 4 are:

SPA Pathway 1: Direct disturbance or mortality effects to **SCI species within an SPA**

SPA Pathway 2: Indirect effects to **SCI species within an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species)

SPA Pathway 3: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, or through a reductions in prey item species outside their respective SPA.

SPA Pathway 4: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. disturbance or mortality effects to SCI species outside their respective SPA).

The mitigation measures detailed in Table 6-11 (over) will be implemented during the development of the Whole UWF Project:

6.5.2.1 Mitigation Measures, Management Plans, Emergency Procedures & Best Practice Measures

Table 6-11: Upperchurch Windfarm Mitigation Measures to avoid/ reduce effects via SPA Pathways 1 to 4

Relevant Planning Conditions to ensure mitigation implementation	
WF-MM-22	A suitably qualified ecologist will be engaged to oversee the Ecological Management Plan over the life time of the wind farm. All site actions and monitoring measures will be required to be undertaken by the developer and under the supervision of the ecologist to achieve the objectives of the plan.
Condition 2	All environmental mitigation measures set out in the Environmental Impact Statement, Natura Impact Statement and associated documentation submitted by the applicant to the planning authority and An Bord Pleanála, shall be implemented in full, except as may otherwise be required in order to comply with the planning conditions.
Condition 18(a)	The Ecological Management Plan submitted to the planning authority on the 27th day of November, 2013, shall be implemented in full.
Upperchurch Windfarm Mitigation Measures (WF-MM) which will avoid/reduce effects via SPA Pathways 1 to 4	
Condition 17	Prior to the carrying out of any construction works between mid-march and mid-August, a survey for breeding hen harriers shall be carried out by a competent, experienced ornithologist. The survey will cover the area within 500 metres of the works to be carried out during the above period. It will be the responsibility of the ornithologist to ensure that the survey methodology is sufficient to ensure that a hen harrier breeding site is not overlooked. Taking into account the results of this survey, no construction works shall be carried out within the above period within 500 metres of a pre-nesting breeding site and/or nest, except with the written approval of the National Parks and Wildlife Service.
Condition 18(b)	A timescale for the provision of the enhanced foraging areas including rush managements, the provision of additional hedgerows enclosures for native scrub and trees and measures by landowners in relation to spreading, burning, interference with drainage, retention of hedgerows, restrictions on use of poisons and new forestry plantation shall be agreed with the planning authority following consultation with the National parks and Wildlife service.
Condition 18(c)	A programme of ongoing surveys and monitoring of the species in years 2 and 3 after the commencement of the operation of the turbines shall be submitted to, and agreed in writing with the planning authority, following consultation with the National parks, and prior to the commencement of development works on the site.
WF-MM-23	In order to mitigate the loss of potential foraging habitat for hen harrier, due to the construction of the wind farm at Upperchurch, 128 Hectares of habitat will be management adjacent to the area of development to the benefit of hen harrier. The Upperchurch Hen Harrier Scheme will involve the planting, with native species, of approximately 2.8km of new hedgerows. This habitat management will be implemented and management through the Upperchurch Hen Harrier Scheme which will form part of the Ecological Management Plan.
WF-MM-21	Vehicular movements will be restricted to the footprint of the development. This implies that machinery will be kept on the site roads and hardstanding areas and aside, from advancing excavations, avoid moving onto areas not delineated on the site drawing.
WF-MM-30	The following measures are designed to reduce the predicted impacts on bird populations: • Pre-construction monitoring will be undertaken within the site, and will continue during the construction phase. • Vegetation clearance, including the felling of trees, scrub and hedgerow, will be undertaken outside the breeding bird period (1st March to the 31st of August). • Work will begin before the breeding season begins to ensure that incubating birds or birds with young are not displaced by work commencing during the breeding season. • Damage to or loss of trees will be kept to a minimum, during the construction phase. • Machinery will be kept on roads and hardstanding areas, and aside from advancing roads, will not move onto habitats beyond the proposed development footprint, in order to prevent unnecessary damage or disturbance.

Specific Management Plans which include measures designed to or which will in part avoid/reduce effects via SPA Pathways 1 to 4	
WF-PLAN	Ecological Management Plan
WF-PLAN	Upperchurch Hen Harrier Scheme

Table 6-12: UWF Related Works Mitigation Measures to avoid/ reduce effects via SPA Pathways 1 to 4

Monitoring to ensure mitigation implementation	
RW-EMP Section 7.1.1	The Environmental Clerk of Works will monitor the compliance of the construction works with the EMP, and will engage specialist environmental consultants, such as ecologists, hydrologists and archaeologists, as required.
UWF Related Works Project Design Environmental Protection Measure (RW-PD) which will avoid/reduce effects via SPA Pathways 1 to 4	
RW-PD-07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
RW-PD-26	Confirmatory hen harrier breeding surveys will be completed, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter. No construction works for UWF Related Works will take place during the hen harrier breeding season (March to August).
RW-PD-27	During the hen harrier roosting season (October to February inclusive), construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset.
RW-PD-28	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.
Specific Management Plans which will avoid secondary deterioration of adjacent SPA habitats, within and ex-situ the European Site	
RW-PLAN	Surface Water Management Plan (SWMP)
RW-PLAN	Invasive Species Management Plan (ISMP)
Best Practice Measures which include measures which will in part avoid/reduce effects via SPA Pathways 1 to 4	
RW-BPM-12	Monitoring of nesting and roosting Hen Harrier (Circus cyaneus)
RW-BPM-17	Best practice measures for the removal of vegetation during construction

Table 6-13: UWF Grid Connection Mitigation Measures to avoid or reduce effects via SPA Pathways 1 to 4

Monitoring Measure to ensure mitigation implementation	
GC-PD-46	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 Appendix A10 in Reference Document 25 of 36).

UWF Grid Connection Project Design Environmental Protection Measure (GC-PD) which will avoid/reduce effects via SPA Pathways 1 to 4	
GC-PD-05	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).
GC-PD-01	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.
GC-PD-02	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.
GC-PD-03	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).
GC-PD-58	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.
GC-PD-07	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 Upperchurch Windfarm Turbines along these local roads.
GC-PD-11	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.
Specific Management Plans which will avoid secondary deterioration of adjacent SPA habitats, within and ex-situ the European Site	
GC-PLAN	Surface Water Management Plan (SWMP)
GC-PLAN	Invasive Species Management Plan (ISMP)

Table 6-14: UWF Replacement Forestry Mitigation Measures to avoid/ reduce effects via SPA Pathways 1 to 4

Monitoring to ensure mitigation implementation	
RF-EIAR Section 5.2.4.3	An Environmental Clerk of Works will be employed during the planting stage to monitor the implementation of the environmental protection measures.
UWF Replacement Forestry Project Design Environmental Protection Measure (RW-PD) which will avoid/reduce effects via SPA Pathways 1 to 4	
RF-PD 06	No planting works will take place within 500m of an active hen harrier nest, or active nesting activity, during the months of March to August. Additionally, during the winter season, October to February, planting works will only be carried out during the period between one hour after sunrise and one hour before sunset in areas within 1000m of an active winter roost.
RF-PD 07	The lands will be protected from livestock by the perimeter fence.
Specific Management Plans which will avoid secondary deterioration of adjacent SPA habitats, within and ex-situ the European Site	
RF-PLAN	Invasive Species Management Plan (ISMP)

Table 6-15: Mitigation Measures for UWF Other Activities to avoid or reduce effects via SPA Pathways 1 to 4

Monitoring to ensure mitigation implementation	
EMP 2021 EMP 2019 EMP 2019	The environmental protection measures for UWF Other Activities will be implemented as part of the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm and will be incorporated into their respective Environmental Management Plans. For example, measures listed above which are relevant to Overhead Line Activities will be monitored through the UWF Grid Connection Environmental Management Plan.
UWF Other Activities Environmental Protection Measure (OA-PD) which will in part avoid/reduce effects via SPA Pathways 1 to 4.	
OA-PD-01	Except with the approval of the National Parks and Wildlife Service: no activities will be carried out within 500 metres of an active hen harrier nest or nesting attempt; no activities will be carried out within 30m of an active main badger set or within 150m of an active otter holt.
OA-PD 02	In order to prevent disturbance to breeding birds, tree trimming for Haul Route Activities will be conducted outside of the bird breeding season.

6.5.2.2 Effectiveness of these measures

The Mitigation Measures (Project Design Measures, Management Plans and Best Practice Measures), listed in Section 6.5.2.1 above, have been developed by the ecological expert members of the project team, based on best practice, including recommendations within the Irish context, and will adhere to the following Standard Guidelines, peer reviewed publications, studies, and Best Practice documentation:

- Wilson et al., (2015) The interactions between Hen Harriers and wind turbines: Final Project Report. BEES, University College Cork.
- Forest Service, (2012). Appropriate Assessment Procedure. Information Note.
- Currie & Elliott, (1997) Forests and birds: a guide to managing forests for rare birds. Cambridge: Forestry Authority and Royal Society for the Protection of Birds
- Forestry Commission Scotland, (2006) Guidance Note 32: Forest operations and birds in Scottish forests
- Romin & Muck, (2002) Utah field office guidelines for raptor protection from human and land use disturbances. Salt Lake City: USFWS Utah Field Office.
- Whittington & Allen, (2008) Guidelines for raptor conservation in the western United States. Washington DC, USA: U.S. Fish and Wildlife Service, Region 9, Division of Migratory Bird Management.
- Livesey et al., (2016) Database of bird flight initiation distances to assist in estimating effects from human disturbance and delineating buffer areas. Journal of Fish and Wildlife Management 7: 181–191.
- Scottish National Heritage (2009) Monitoring the impact of onshore wind farms on birds - January 2009. Guidance Note.
- Scottish National Heritage (2016) Dealing with Construction and birds. Guidance Version 3.
- Scottish National Heritage (2017) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities. Version 2. https://www.nature.scot/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms
- Ruddock and Whitfield (2007) A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage. SNH, Battleby.
- Hen Harrier Conservation and the Forestry Sector in Ireland. V3.2. NPWS. https://www.npws.ie/sites/default/files/publications/pdf/HHTRP%20-%20Forestry%20-%20V3.2.pdf
- Percival, S.M. Predicting the effects of wind farms on birds in the UK: the development of an objective assessment method. [ed.] M., Janss, F.E., Ferrer, M. De Lucas. Madrid: Quercus, 7, pp. 137-152.

The effectiveness of the Management Plans are described at Section 6.5.1.2 above.

6.5.2.3 Implementation of the Mitigation Measures

The Mitigation Measures will be implemented by the Project Manager and the main Contractors during the construction stage. Implementation of the Mitigation Measures, will be implemented through Environmental Management Plans (EMPs) – i.e. Upperchurch Windfarm nvironmental Management Plan 2021 (Updated to Include the Proposed Larger Turbines & Met Masts), the UWF Related Works Environmental Management Plan (2019), and the UWF Grid Connection Environmental Management Plan (2019).

The EMPs will be an important contract document for the two main construction contractors (Contractors) (i) for the Upperchurch Windfarm (including UWF Related Works) and (ii) for UWF Grid Connection. The Contractors 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 Contractors with the EMPs through liaising with the Construction Site Managers and the Project Managers, monitoring construction works on a daily basis and by carrying out regular audits on EMP compliance. The Environmental Clerk of Works will be resourced to employ a team of environmental specialists including a Site Ecologist, and an Invasive Species Specialist. The Contractors will be contractually obliged to comply with the requirements of the Environmental Clerk of Works to ensure that the EMPs are implemented.

All surveys for breeding or roosting Hen Harrier, and monitoring of temporal restrictions of works in relation to nesting or roosting Hen Harrier will be undertaken by a suitably qualified Ornithologist(s) (and member of CIEEM) with experience in the survey and management of Hen Harrier.

6.5.2.4 Degree of confidence in the likely success of the mitigation measures

All protection measures have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. As such there is a very high degree of confidence in their likely success.

6.5.2.5 Monitoring of the Implementation and Effectiveness of the Mitigation Measures

The appointed Environmental Clerk of Works and their team of environmental specialists (including Site Ecologists and specialist Ornithologist(s)), will monitor the implementation of the Mitigation Measures through the Upperchurch Windfarm nvironmental Management Plan 2021 (Updated to Include the Proposed Larger Turbines & Met Masts), the UWF Related Works Environmental Management Plan, and the UWF Grid Connection Environmental Management Plan .

In addition, 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 500m of the construction works areas associated with Upperchurch Windfarm, and within 2km of the entire construction works area boundary for UWF Related Works and UWF Grid Connection. These surveys will be completed prior to the start-up of all construction activities. The Project Ecologist will keep NPWS informed of the real-time status of nesting Hen Harrier as a result of the monitoring associated with this project.

6.5.2.6 How any mitigation failure will be addressed

The Mitigation measures (Project Design Measures and Management Plans) prepared specifically for this project have been designed in line with Best Practice and constitute the Best Available techniques following scientific literature and field baseline verification. The Mitigation Measures are considered to be robust and proven measures for the avoidance of significant adverse effects to European Sites.

The Mitigation Measures will be implemented by the Project Manager and the main Contractor during the construction stage. Implementation of the measures, including the Management Plans, will be carried out under Environmental Management Plans for the Upperchurch Windfarm, for UWF Related Works and for the UWF Grid Connection.

The Environmental Management Plans includes a supervisory structure which ensures accountability for all works elements, with requirements for a Project Manager and an independent (of the Contractor) Environmental Clerk of Works along with suitably qualified specialists (including Site Ecologist and specialist Ornithologist(s)) who will supervise the works and monitor the implementation of Mitigation Measures in order to ensure that sensitive works elements are carried out in a manner which delivers the planned outcomes within the parameters of the impact assessment, as specified.

On this basis, it can be confidently concluded that failures in the mitigation measures and their prescribed outcomes will be avoided.

Nonetheless, the Environmental Clerk of Works will have a full-time presence on-site during the construction stage, and environmental experts will supervise works at environmentally sensitive locations. This will ensure that any unforeseen significant adverse effects are identified in a timely manner and appropriate remedial action taken immediately. The Environmental Clerk of Works will have a 'stop-works' authority to temporarily stop works over part of the site to avoid either an infringement of the Environmental Commitments or an unforeseen adverse environmental event. Works will not be allowed to re-commence until the issue is resolved.

6.6 Evaluation of Adverse Impacts to the Lower River Suir SAC

The Screening stage evaluated the potential for the Proposed Larger Turbines and Met Masts and the Whole UWF Project, to impact the Lower River Suir SAC via identified impact pathways (Section 5.5.1). The potential for impacts was identified with regard to individual Qualifying Interests of the SAC. These impacts are evaluated further within this Section 6.6 of this Appropriate Assessment Report 2021, to determine whether the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities, will affect the favourable conservation status of these Qualifying Interests, and thus the overall integrity of the Lower River Suir SAC.

The evaluation of the impacts of the Proposed Larger Turbines and Met Masts and the Whole UWF Project, on the integrity of the Lower River Suir SAC takes account of the following information:

- conservation objectives, outlined at Section 6.6.1 below, for the Qualifying Interests of the Lower River Suir SAC which were screened in for evaluation at Stage 2;
- the potential impact pathways to Qualifying Interests which were screened in for evaluation, these impact pathways are identified in Section 6.6.2;
- descriptions of the Proposed Larger Turbines and Met Masts and the Whole UWF Project, as described in Section 2 of this Appropriate Assessment (AA) Reporting 2021 (Stage 2), and its Mitigation Measures as described in Section 6.5.1 of this report;
- descriptions of the other unrelated projects and activities as outlined in Section 2.8 of this report.

6.6.1 Conservation Objectives of Lower River Suir SAC (002137)

The site-specific conservation objectives of the Lower River Suir SAC aims to define favourable conservation condition for the particular habitat or species at that site. These objectives and conditions are summarised in Table 6-16 below in respect of the Qualifying Interests of the Lower River Suir SAC which were screened in for further evaluation.

The conservation objectives of the Lower River Suir SAC are available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites. The conservation objectives outlined in the table below *(over)* were sourced from NPWS *Conservation Objectives: Lower River Suir SAC 002137. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 28/03/2017] and should be read in conjunction with any other supporting documentation on the referenced website as referenced above.

Table 6-16: Conservation Objectives of the Lower River Suir SAC (002137)

Lower River Suir SAC (002137)			
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260)	**To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The description of habitat 3260 covers upland rivers with bryophytes and macroalgae to lowland depositing rivers with pondweeds and starworts. The selection of Lower River Suir SAC used this broad interpretation. Conservation objectives for habitat 3260 concentrates on the high conservation value sub-types, however, little is known of the habitat's distribution or its sub-types in Lower River Suir SAC. There is a large number of lowland and tidal rivers in the SAC, as well as faster-flowing tributaries. Note: rooted macrophytes should be absent or trace (<5% cover) in freshwater pearl mussel (*Margaritifera margaritifera*) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Clodiagh River (Portlaw) within this SAC, because the mussel requires environmental conditions close to natural background levels.
Habitat distribution	Occurrence	No decline, subject to natural processes	Further study is needed of Irish sub-types and their conservation value to interpret the broad description of habitat 3260 (European Commission, 2013). As noted above, little is known about the distribution of the habitat and its sub-types in Lower River Suir SAC. The uncommon, protected opposite-leaved pondweed (*Groenlandia densa*) was recorded in the SAC from floodplain ditches of the Suir near Carrick-on-Suir and Clonmel, as well as the Clodiagh near Portlaw (Colgan and Scully, 1898; NPWS internal files). See NPWS (2012) for information on the requirements of opposite-leaved pondweed. There are no known records for rare or threatened bryophytes from the rivers in the SAC (Lockhart *et al.*, 2012). The rivers in the SAC are mainly lowland, depositing and tidal, and are likely dominated by marginal and submerged higher plants. Some fast-flowing rivers also occur that should, naturally, be dominated by macroalgae and bryophytes, with limited submerged or emergent higher plants.
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	High conservation value sub-types are associated with natural hydrology. A natural flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For many sub-types, high flows are required to maintain the substratum necessary for the characteristic species. Flow variation can be particularly important, with high and flood flows being critical to the hydromorphology. Other aspects of hydrology, such as tidal regime, are important for certain sub-types of the habitat. The rivers in the SAC vary from naturally flashy, through depositing to tidal reaches.
Hydrological regime: groundwater discharge	Metres per second	Maintain appropriate hydrological regime	Even small groundwater contributions can significantly alter hydrochemistry, particularly where there is basic bedrock and/or subsoils. Freshwater seepages can be very important in tidal reaches
Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	Opposite-leaved pondweed (*Groenlandia densa*) is typical of the tidal reaches of large Irish rivers, e.g. Suir, Slaney, Shannon and Blackwater (see Preston and Croft, 2001; Preston, 2003). This species is listed as Near Threatened (Wyse Jackson *et al.*, 2016) and is protected on the Flora (Protection) Order, 2015 (Statutory Instrument No. 356 of 2015). Both the

Lower River Suir SAC (002137)			
			disturbance and substratum associated with the tidal regime may be important drivers
Substratum composition: particle size range	Millimetres	Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes	Many of the high conservation value sub-types are dominated by coarse substrata, and it is likely that bedrock, boulders, cobbles and coarse gravels were naturally abundant in many tributaries in this SAC, particularly where the freshwater pearl mussel (*Margaritifera margaritifera*) occurred. Fine substrata are naturally abundant in depositing and tidal reaches. The size and distribution of particles are largely determined by the river flow. The chemical composition (particularly minerals and nutrients) of the substratum is also important. The quality of finer sediment particles is a notable driver of rooted plant communities. Note: increased fine sediment is contributing to the unfavourable status of the freshwater pearl mussel in the Clodiagh. See the freshwater pearl mussel (1029) conservation objective
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The specific targets may vary among sub-types. Depositing and tidal stretches of rivers may, naturally, be more nutrient-rich and, therefore Water Framework Directive (WFD) good status may suffice in terms of nutrient and oxygenation standards, and EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos. Faster flowing tributaries that are naturally dominated by bryophytes and macroalgae typically require WFD high status. High status targets apply to freshwater pearl mussel (Margaritifera margaritifera) habitat in the Clodiagh (see The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 - S.I. No. 296 of 2009). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), Environmental Protection Agency (EPA) river water quality reports (e.g. Bradley *et al.*, 2015) and Ní Chatháin *et al.* (2013)
Typical species	Occurrence	Maintain typical species in good condition, including appropriate distribution and abundance	The sub-types of this habitat are poorly understood and their typical species have not yet been fully defined. The typical species may include higher plants, bryophytes, macroalgae and microalgae, and invertebrates. As noted above, the protected vascular plant species opposite-leaved pondweed (*Groenlandia densa*) is associated with rivers and floodplains in the SAC. The banks of the Suir, particularly its tidal stretches, support a notable population of the rare *Rumex crispus subsp. uliginosus* (Green, 2008)
Floodplain connectivity	Hectares	Maintain floodplain connectivity necessary to support the typical species and vegetation composition of the habitat	River connectivity with the floodplain is important for the functioning of this habitat. Channels with a naturally functioning floodplain are better able to maintain habitat and water quality (Hatton-Ellis and Grieve, 2003). Floodplain connectivity is particularly important in terms of sediment sorting and nutrient deposition. High conservation value rivers are intimately connected to floodplain habitats and function as important wildlife corridors, connecting otherwise isolated or fragmented habitats in the wider countryside (Hatton-Ellis and Grieve, 2003; Mainstone *et al.*, 2016). Alluvial woodland (91E0) is an important feature of rivers in Lower River Suir SAC (see the conservation objective for 91E0)
Fringing habitats Hectares	Hectares	Maintain marginal fringing habitats that support the typical species and vegetation composition of the habitat	Riparian habitats (including those along lake shores), particularly natural/semi-natural woodlands and wetlands, are an integral part of the structure and functioning of river systems, even where they do not form part of a natural floodplain. Fringing habitats can contribute to the aquatic food web (e.g. allochthonous matter such as leaf fall), provide habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates, assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling. Shade may also be important in suppressing algal growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. See Mainstone *et al.* (2016). Alluvial and riparian woodland is important for the rivers in Lower River Suir SAC

Lower River Suir SAC (002137)			
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6340]	**To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat in the SAC is unknown. The lowland type communities of the habitat are considered to occur in association with the various areas of alluvial forest (91E0) within the SAC, notably at Fiddown, below Carrick-on-Suir and at Tibberaghny Marshes. This habitat type would also be expected to occur in association with other woodland types in fringe areas along the river and with areas of open marsh or wet grassland within the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes on area above
Hydrological regime: Flooding depth/height of water table	Metres	Maintain appropriate hydrological regime	This habitat requires winter inundation, which results in deposition of naturally nutrient-rich sediment
Vegetation composition: positive indicator species	Number of species at a representative number of monitoring stops	At least three positive indicator species present	Attribute and target based on O'Neill et al. (2013),where the list of positive indicator species is also presented
Vegetation composition: positive indicator species	Percentage cover at a representative number of monitoring stops	Cover of positive indicator species at least 40%	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species is also presented
Vegetation composition: non native species	Percentage cover at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013). The spread of Japanese knotweed (*Fallopia japonica*) is noted as a threat at Tibberaghny (NPWS internal files)
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Cover of negative indicator species not more than 33%	Attribute and target based on O'Neill et al. (2013), where the list of negative indicator species is also presented
Vegetation composition: scrub, bracken and heath	Percentage at a representative number of monitoring stops	Cover of scrub, bracken (Pteridium aquilinum) and heath not more than 5%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: height	Height (centimetres) at a representative number of monitoring stops	Herb height at least 50cm	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Cover of bare soil not more than 10%	Attribute and target based on O'Neill et al. (2013)

Lower River Suir SAC (002137)			
Physical structure: grazing and disturbance	Square metres in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013)
Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	**To restore the favourable conservation condition of Old sessile woods with *Ilex* and *Blechnum* in the British Isles in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 29.3ha for sites surveyed. See map 4	Old sessile oak woods with Ilex and Blechnum were surveyed in Lower River Suir SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Lyranearla (NSNW site code: 1834) and Inchinsqullib Wood (NSNW site code: 1898). The area of old oak woodlands in the surveyed sites within the SAC is estimated to be 29.3ha. It is important to note that further unsurveyed areas are present within the SAC, including at Portlaw Wood within the Curraghmore Estate and other small pockets within the SAC (NPWS internal files). Map 4 shows the old oak woodlands surveyed by Perrin et al. (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 4	Distribution shown based on Perrin et al. (2008). NB further unsurveyed areas are present within this SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semimature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak (*Quercus petraea*) generally regenerates poorly. In suitable sites, ash (*Fraxinus excelsior*) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m³ per hectare; number per hectare	At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha;	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem

Lower River Suir SAC (002137)			
		both categories should include stems greater than 40cm diameter	
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-listed and other rare or localised species. The rare lichen tree lungwort (*Lobaria pulmonaria*), an indicator of ancient woodlands, is found in Portlaw Wood (NPWS internal files)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak (*Quercus petraea*) and birch (*Betula pubescens*)	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Rhododendron (*Rhododendron ponticum*) infestation at Portlaw Wood is noted as being serious, as well as the occurrence of beech (*Fagus sylvatica*), sycamore (*Acer pseudoplatanus*) and silver fir (*Abies alba*) in the woodland (NPWS internal files). Beech was reported from Lyranearla (NSNW site code: 1834) by Perrin et al. (2008)
Alluvial Forests* (91E0)	**To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) in the Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least c.32.9ha for sites surveyed. See map 5	Alluvial forest was surveyed in Lower River Suir SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Fiddown (NSNW site code: 0022), Mountbolton (NSNW site code: 1823) and Ballycanvan Big (NSNW site code: 1839). Fiddown (0022) was also included in a national monitoring survey (O'Neill and Barron, 2013). The area of alluvial woodlands in the surveyed sites within the SAC is estimated to be 32.9ha. It is important to note that further unsurveyed areas of alluvial forest are present within the SAC, for example at islands below Carrick-on-Suir, at Shanbally (Coillte LIFE project site), Tibberaghny Marshes, along the lower stretches of the more westerly of the Suir tributaries and along both banks of the Suir as far east as the Dawn River (NPWS internal files). Map 5 shows the alluvial woodlands surveyed by Perrin et al. (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 5	Distribution based on Perrin *et al.* (2008). NB further areas are likely to be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing	Described in Perrin *et al.* (2008) and NPWS internal files

Lower River Suir SAC (002137)			
		mature trees; sub canopy layer with semi- mature trees and shrubs; and well-developed herb layer	
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin *et al.* (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder (*Alnus glutinosa*) and oak (*Quercus spp.*) tend to regenerate poorly. Ash (*Fraxinus excelsior*) often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river floodplains, but not for woodland around springs/seepage areas
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) identify the site Ballycanvan Big (NSNW site code: 1839) as being "possible ancient woodland"
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin *et al.* (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix* spp), oak (*Quercus robur*), ash (*Fraxinus excelsior*) and	Species reported in Perrin *et al.* (2008) and NPWS internal files

Lower River Suir SAC (002137)			
		birch (*Betula pubescens*)	
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Norway spruce (*Picea abies*) and sycamore (*Acer pseudoplatanus*) occur at Shanbally (NPWS internal files). Spread of Japanese knotweed (*Fallopia japonica*) is a problem at Tibberaghny (NPWS internal files). Cherry laurel (*Prunus laurocerasus*) and rhododendron (*Rhododendron ponticum*) have been reported as occurring in part of Ballycanvan Big (NSNW site code: 1839) by Perrin et al. (2008), but not within the alluvial woodland.
Taxus baccata woods of the British Isles [91J0]	**To restore the favourable conservation condition of Taxus baccata woods of the British Isles* in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Taxus baccata woods of the British Isles habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat is unknown. Yew (Taxus baccata) woodland is known to occur at Cahir Park in an area of c.500m by 50m. Cahir Park was included in a national monitoring survey of yew woodland (Cross and Lynn, 2013). NB further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline	A narrow stand of yew woodland occurs along the steep western flank of a limestone knoll at Cahir Park within Lower River Suir SAC. See Cross and Lynn (2013) for further details. NB further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing	Yew (Taxus baccata) has been planted on deeper soil on top of the knoll at Cahir Park. If the transplants survive, the area of yew woodland will be considerably expanded. See Cross and Lynn (2013) for further details
Woodland structure: cover and height	Percentage and metres	Maintain diversity and extent of community type	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yew (Taxus baccata) regenerates poorly under its own canopy but can regenerate under a canopy of other species or in the open if the competition from the field layer is not too strong
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-data and other rare or localised species

Lower River Suir SAC (002137)			
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Vegetation composition: typical species	Occurrence	A variety of typical native species present, including yew (Taxus baccata) and ash (Fraxinus excelsior	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The most common invasive species in this woodland type is beech (*Fagus sylvatica*), although there is evidence to suggest that it actually facilitates regeneration of yew (*Taxus baccata*). Numerous exotic species, including cherry laurel (*Prunus laurocerasus*) in particular, have been reported from Cahir Park (Cross and Lynn, 2013)
Freshwater Pearl Mussel (*Margaritifera margaritifera*)	**To restore the favourable conservation condition of Freshwater Pearl Mussel in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	Measure	Target	Notes
Distribution	Kilometres	Restore distribution to 10.4km. See map 6	The conservation objective applies to the Clodiagh freshwater pearl mussel (*Margaritifera margaritifera*) population, which is listed on The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. (S.I. 296 of 2009). Full baseline distribution and abundance mapping was conducted in 2006 (Ross, 2006). Mussel habitat is widespread in the Clodiagh, with mussels almost continually present in low numbers from downstream of Clonea to above Portlaw (Ross, 2006). Mussels were nowhere abundant; maximum density was 3 per square metre (Ross, 2006). The habitat is significantly below carrying-capacity. The distribution in the Clodiagh has contracted since the 1990s (Ross, 2006). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Clodiagh system. See NPWS (2010) for further information
Population size	Number of adult mussels	Restore population to at least 10,000 adult mussels	Ross (2006) counted 1,206 mussels and estimated a total population of 2,412, concluding that, given the large areas of physically suitable habitat, a much larger population was previously present and a major population decline had occurred. Ross (2009) measured an 18.5% decline in mussel numbers between 2006 and 2009 at transect 1, indicating continued losses. Ross *et al.* (2017) recorded 'rapid and alarming' declines of 56-94% between 2006 and 2016 at five monitoring locations (67% decline overall). Moorkens (2010) estimated the population to be less than 10,000. The target of 10,000 is considered appropriate for a functional, self-sustaining population. NPWS (2013), in producing a national population estimate, assumed the Clodiagh population had declined at a rate of 3% per year. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Clodiagh system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of each population no more than 65mm in length; and at least 5% of each population no more than 30mm in length	Mussels ≤65mm are 'young mussels' and found buried in the substratum or beneath adult mussels. Mussels ≤30mm are 'juvenile mussels' and always buried in the substratum. See the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The Clodiagh failed both targets in 2006, 2009 and 2016 (Ross, 2006, 2009; NPWS, 2010; Ross *et al.*, 2017). Ross (2006) found no juveniles, ≤65mm extremely uncommon, smallest individual was 45.4mm and 97% was >80mm. In 2009, the smallest mussel was 78mm and (based on Ross, 1988) 15-20 years old (Ross, 2009). The smallest of 21 mussels measured in 1986 was 48.6mm (Ross, 1988). NPWS (2010) concluded there had been no successful recruitment from 1986 to 2009. The Clodiagh population is considered to be unsustainable owing to lack of survival of juvenile and adult mussels. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Lower River Suir SAC (002137)			
Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. The Clodiagh failed both targets in 2009 (Ross, 2009; NPWS, 2010) and, as noted above, a major population decline has occurred (Ross, 2006; Ross *et al.*, 2017), and is presumed to be on-going. In 2009, 1 transect and 1 delimited count were counted: T1 numbers had fallen from 27 in 2006 to 22, representing a 18.5% decline, while numbers were the same in C2. Seven dead shells were found among 23 live mussels at one location, indicating high mortality in parts of the Clodiagh. In 2016, 67 mussels were counted at five monitoring sites that had 205 mussels in 2006 (Ross *et al.*, 2017). The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system.
Suitable habitat: extent	Kilometres	Restore suitable habitat in more than 8.8km in the Clodiagh system and any additional stretches necessary for salmonid spawning	Mussel habitat in the Clodiagh is known to occur from Clonea to Portlaw, and is sparsely occupied from c.630m downstream of Clonea to c.1.8km above Portlaw (Ross, 2006). Mussels were recorded at Portlaw as recently as the 1990s and downstream of Portlaw in the early 20th century. It is possible that some mussel habitat occurs upstream or downstream of the mapped stretches, but few mussels are likely to be found (Ross, 2006). The mussel habitat has been severely impacted for a significant period by sedimentation, other hydromorphological changes, organic pollution and eutrophication (NPWS, 2010). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The species' habitat is a combination of the area of 1) habitat adult and juvenile mussels can occupy; 2) spawning and nursery habitats host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat but may lie upstream of the generalised mussel distribution. Only spawning areas that regularly contribute juvenile fish to adult mussel habitat should be considered. Availability of mussel and fish habitat is determined by flow and substratum conditions. It is highly sensitive to hydromorphological changes, sedimentation and enrichment. Pressures throughout the catchment contribute to such impacts. Mussel habitat is widespread in the Clodiagh but in unfavourable condition owing to sedimentation, other hydromorphological changes and nutrient enrichment. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system.
Water quality: Macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality - macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93	The EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). In 2009, the habitat in the Clodiagh system failed the macroinvertebrate target, but passed the phytobenthos target (Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). Q values in the mussel habitat were Q3-Q4 (Morgan, 2009). There has been a gradual decline in quality at several main-channel sites since the late 1970s (Morgan, 2009). Sewage discharge at Clonea is impacting water quality downstream of Clonea Bridge (Ross, 2006; Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher	Percentage	Restore substratum quality - filamentous algae: absent or trace (less than 5%); macrophytes:	The Clodiagh failed the macrophyte target, but marginally passed the macroalgal target in 2009 (NPWS, 2010). Patches of abundant *Ranunculus* were recorded by all surveyors, with up to 40% cover in places (Morgan, 2009; Ross, 2009; Ní Chatháin, 2010; NPWS, 2010). Ross (2006) also recorded widespread and, in places, abundant (up to 80%) *Ranunculus*. Algae were generally absent in 2009, however up to 10% Cladophora cover was recorded downstream of Clonea Bridge (Ní Chatháin, 2010;

Lower River Suir SAC (002137)			
plants)		absent or trace (less than 5%)	NPWS, 2010), where sewage fungus had previously been recorded (Ross, 2006). Algae were also sparse in 2006 and 2016 (Ross, 2006; Ross *et al.*, 2017). Tree shade may be supressing plant growth over much of the mussel habitat (Ross *et al.*, 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system.
Substratum quality: sediment	Occurrence	Restore substratum quality - stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The Clodiagh failed the target for the Sub-basin Management Plan in 2009 and 2016, with strong silt plumes recorded in mussel habitat (Ross, 2009; NPWS, 2010; Ross *et al.*, 2017). Ross *et al.* (2017) recorded extremely heavy silt plumes at every site, even in fast riffles. Ross (2006) recorded significant siltation of the mussel habitat and observed river bank erosion and collapse, and livestock entry to the river. Silt in the Clodiagh is providing a rooting medium for macrophytes. Sufficient survival of juvenile and adult mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. Average redox was very poor, 23-28% at four sites monitored in 2016, only three of the 40 measurements was <20% (Ross *et al.*, 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Hydrological regime: flow variability	Metres per second	Maintain appropriate hydrological regime	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other key factor). To restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fine sediment or growth of algae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle; see Moorkens and Killeen (2014). Groundwater inflow to the substratum contributes to water-cycling. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of Clodiagh system.
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist *et al.* (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for mussels and a lack of mussel recruitment, while significantly lower host fish density and biomass were associated with high juvenile mussel numbers. Fish movements must be such that 0+ fish remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. No glochidia were found on young Clodiagh fish in May 2009, although six trout and 38 salmon were caught (Johnston, 2009; NPWS, 2010).
Fringing habitat: area and condition	Hectares	Restore the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, particularly natural/semi-natural woodlands and wetlands, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Fringing habitats aid in the settlement of fine suspended matter, protect banks from erosion, contribute to nutrient cycling and to the aquatic food web (e.g. allochthonous matter such as leaf fall) and provide habitat for life-stages of fish, birds and aquatic

Lower River Suir SAC (002137)			
			invertebrates. Shade may also be important in suppressing algal and macrophyte growth in enriched rivers (e.g. along parts of the Clodiagh) and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
White-clawed Crayfish (*Austropotamobius pallipes*)	**To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution	Occurrence	No reduction from baseline. See map 7	White-clawed crayfish (*Austropotamobius pallipes*) occurs extensively on the River Suir and on many of its tributaries. On the River Suir main channel, the species has been recorded on almost the entire length of non-tidal river from the most upstream point at Cabragh, near Thurles, to downstream of Kilsheelan. It is also present on the following tributaries: Anner and lashawley, Clodiagh and Owenbeg, Multeen, Tar, Nier, and Clodiagh Lower
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries	See Reynolds *et al.* (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as a major direct threat to this species and as a disease vector. Ireland is currently free of non-native invasive crayfish species. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as a major threat and crayfish plague has occurred in Ireland even in the absence of alien vectors. Disease can, in some circumstances, be introduced through contaminated equipment and water in the absence of vector species. See Reynolds (1998) for further details
Water quality	EPA Q value	At least Q3-4 at all sites ssampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No reduction in habitat heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus, such as leaf litter. These conditions must be available on the whole length of occupied habitat
Sea Lamprey (*Petromyzon marinus*)	**To restore the favourable conservation condition of Sea Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas (Gargan *et al.*, 2011; Rooney *et al.*, 2015). Float-over surveys by Inland Fisheries Ireland (IFI) point to little success of sea lamprey adults in passing the weirs in Clonmel in Lower River Suir SAC. Modifications to these weirs would facilitate upstream passage of sea lamprey. IFI has embarked on a programme of detailed survey of major barriers in SAC catchments, in the context of sea lamprey passage, using the SNIFFER (Scotland and Northern Ireland Forum for Environmental Research) WFDIII methodology

Lower River Suir SAC (002137)			
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). A catchment wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003). A catchment-wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Lampreys spawn in clean gravels. Substantial areas of suitable spawning habitat are available from Cahir to Carrick-on-Suir, but access to areas upstream of Clonmel is problematic
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King *et al.*, 2015). However, it is vital that such sedimenting habitats are retained
Brook Lamprey (Lampetra planeri)	**To restore the favourable conservation condition of Brook Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to lampreys' migration both up- and downstream, thereby possibly limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol *et al.*, 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Brook lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally (Rooney *et al.*, 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King *et al.*, 2015). However, it is vital that such sedimenting habitats are retained
River Lamprey (*Lampetra fluviatilis*)	**To restore the favourable conservation condition of River Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block river lampreys' migration both up- and downstream, thereby limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol *et al.*, 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between river and brook

Lower River Suir SAC (002137)			
		river/brook lamprey present	lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). River lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally in numbers (Rooney *et al.*, 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King *et al.*, 2015). However, it is vital that such sedimenting habitats are retained
Salmon (*Salmo salar*)	**To restore the favourable conservation condition of Atlantic Salmon in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee on Salmon (SSCS) annual model output of CL attainment levels. See SSCS (2016). Attainment of CL estimates are derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Suir is currently below CL, meeting 79% of CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	The target is the threshold value for rivers currently exceeding their conservation limit (CL). The average electrofishing value for the Suir in 2016 was 10.2 salmon fry, which is below the 17 fry target
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*)
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are generally not currently preventing salmon from accessing suitable spawning habitat in Lower River Suir SAC
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

Lower River Suir SAC (002137)			
Otter (*Lutra lutra*)	**To maintain the favourable conservation condition of Otter in Lower River Suir SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid *et al.* 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 116.17ha above high water mark (HWM) and 726.61ha along river banks	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 712.27ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (Kruuk, 2006; NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 382.31km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid *et al.*, 2013) and wrasse and rockling in coastal waters (Kingston *et al.*, 1999)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

6.6.2 Qualifying Interests and potential impact pathways which were screened in for evaluation

The Qualifying Interests of the Lower River Suir SAC and potential impact pathways which were screened in for evaluation are:

Table 6-17: Qualifying Interest Screened In due to potential for the Whole UWF Project to cause effects

Qualifying Interest of the Lower River Suir SAC Screened In	**Impact Pathway Screened in**
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles Alluvial Forests (91E0)* (priority habitat) *Taxus baccata* woods of the British Isles [91J0]* (priority habitat)	SAC Pathway 2, 3
Freshwater Pearl Mussel [1029] White-clawed Crayfish [1092]	SAC Pathway 6, 8
Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106]	SAC Pathway 4*(ex-situ only)*, 5, 6, 7, 8
Otter [1355]	SAC Pathway 4, 5, 6, 7, 8

The SAC Impacts 2 to 8 are described below:

SAC Pathway 2:	Indirect Effects to **QI habitats** of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **within the SAC**
SAC Pathway 3:	Indirect Effects to **QI habitats**, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ***ex-situ*** the SAC
SAC Pathway 4:	Direct effects to **QI species** of an SAC Site (i.e. mortality) ***ex-situ*** the SAC
SAC Pathway 5:	Indirect effects to **QI species** of an SAC Site (i.e. disturbance /displacement) **within** the SAC
SAC Pathway 6:	Indirect effects to **QI species** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within** the SAC
SAC Pathway 7:	Indirect effects to **QI species** of the SAC Site (i.e. disturbance /displacement) ***ex-situ*** the SAC
SAC Pathway 8:	Indirect effects to **QI species** of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ***ex-situ*** the SAC.

6.6.3 Evaluation of the Impact of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts)on Qualifying Interests of the Lower River Suir SAC

In order to evaluate the effect of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project on the integrity of the Lower River Suir SAC, the impact pathways identified above are examined in detail, through a number of focused impact evaluations, as per:

SAC Pathway 2 SAC Pathway 3 SAC Pathway 6 SAC Pathway 8	*Will be examined through these impact evaluations:*	• Decrease in instream aquatic habitat quality • Changes to flow regime • Riparian habitat degradation • Spread of invasive aquatic species
SAC Pathway 4		• Direct Mortality of Fish and Aquatic Species • Direct Mortality of Otter
SAC Pathway 5 SAC Pathway 7		• Disturbance or displacement of fish and aquatic species • Disturbance/Displacement of Otter.

For the purposes of the appraisal herein, effects on aquatic QI Habitats (and their respective conservation objectives) within the Lower River Suir SAC (direct, secondary, within or *Ex-Situ*) as defined via possible pathways SAC Pathway 2, 3, 6 and 8 can be characterised under a number of specific impact types. This includes general decreases in instream aquatic habitat quality, changes to flow regime, degradation of riparian habitat and potential indirect effects via the spread of aquatic invasive species.

Potential effects (direct, indirect within and ex-situ) on those QI species (and their respective conservation objectives) for which the Lower River Suir SAC is designated, as defined via possible pathways SAC Pathway 4, 5 and 7 also fall under a number of typical impact categories, primarily related to the mortality of, or disturbance or displacement of aquatic species, both mammalian and fisheries.

Timing of Impacts

The main construction period will take 12 to 18 months to complete. The projected start date is 2022. Pre-construction activities will be carried out immediately prior to the commencement of the main construction period; these activities will include detailed design, confirmatory surveys, and vegetation clearance (during the appropriate period). The operational phase will commence upon completion of the construction phase. According to the conditions of planning permission for the Upperchurch Windfarm element '*the permission shall be for a period of 25 years from the date of the commissioning of the wind turbines. The wind turbines and related ancillary structures shall then be decommissioned and removed unless, prior to the end of the period, planning permission shall have been granted for their retention for a further period*'. The duration of UWF Related Works will mirror the operational lifetime of the windfarm. UWF Grid Connection will remain in permanent operation, and will not be decommissioned. UWF Replacement Forestry will be a permanent woodland and will not be harvested.

The potential for significant impacts to the Lower River Suir SAC only relates to the construction stage of the Whole Upperchurch Windfarm Project. The construction stage was screened in for evaluation as the construction stage works for the Whole UWF Project will involve the installation of aquatic crossing structures and are taking place in locations with connectivity to the SAC. Potential impacts at this stage include decrease in instream aquatic habitat quality, changes to flow regime, riparian habitat degradation, spread of invasive aquatic species, direct mortality, and disturbance/displacement.

The potential for significant operational stage effects with regard to the Lower River Suir SAC are screened out as works will be small scale, limited in duration and will take place from hardcore areas. In addition the

drainage system will remain in place at the Upperchurch Windfarm site and at Mountphilips Substation site during operation. Maintenance activities for the UWF Replacement Forestry will be of a negligible scale.

As decommissioning works will take place at the turbine hardstanding locations, and will be of limited scale and be short in duration, the potential for significant effects during decommissioning of Upperchurch Windfarm are screened out. UWF Related Works decommissioning is limited to Haul Route Works and the pulling of cables from the Internal Windfarm Cabling ducts. Any necessary Haul Route Activities to transport the turbine blades off-site will be carried out from the public road carriageway. Given the minor nature of these works the potential for decommissioning stage impacts are also screened out from further evaluation.

Evaluation of In-Combination Effects:

The evaluations of the impact of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project on the Qualifying Interests of the Lower River Suir SAC takes into account the in-combination effect of the Whole UWF Project, and the incombination effect of the Whole UWF Project with the following other unrelated projects and activities:

- Agriculture, Forestry and Turf-cutting in the surrounding area

A description of these activities is included in Section 2.8 of this report.

The location of the the Proposed Larger Turbines and Met Masts and of the Whole UWF Project, in relation to the Lower River Suir SAC is illustrated on the following mapping:

AA 2021 Figure 8: Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Lower River Suir SAC

6.6.3.1 Evaluation of SAC Impacts 2, 3, 6 & 8

6.6.3.1.1 Effects on QI habitats and/or QI species along Pathways 2, 3, 6 & 8 from decreases in instream aquatic habitat quality, within or ex-situ the Lower River Suir SAC

Impact Description:

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Sources: Instream works; culvert replacement works; movement of soils and machinery; excavation works; use of hydrocarbons & cement-based compounds; reinstatement works, Instream works; Forestry felling; Earthworks and Groundwork

Other Unrelated Project/Activity Cumulative Impact Sources: Movement of soils and machinery; Excavation works; Forestry felling; Hydrocarbons; Reinstatement; Earthworks and Groundwork

Impact Pathway: Soils; Surface water, Runoff and surface water, Flowpaths

Impact Description: Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community. Instream works at some watercourses will require direct excavation of the banks and bed of the watercourse, which can change the physical character of the watercourse and has the potential to degrade the quality of the baseline habitat which supports the structure, function and diversity of aquatic species. Water quality effects due to sedimentation: Erosion and deposition are natural process in watercourses[20], varying naturally throughout the year. However, additional sediment contributions entering the watercourse, such as from construction works in, adjacent to or upstream of individual watercourses, can have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels by sediment causing mortality impacts for salmonid eggs (affecting recruitment) and interfering with invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, effects on underlying water quality, and/or in turn vegetative composition of QI habitats, or an altered hydrological regime. It may also result in secondary effects on prey item species, which may affect the supporting habitat quality for QI Species.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Decrease in instream aquatic habitat quality

Authorised Upperchurch Windfarm

Impact Magnitude: There is 1 no. watercourse crossing within the Upperchurch Windfarm Site, evaluated as having fisheries value (Class 1, WW2 – within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment). This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Baseline conditions indicated that the aquatic species were present year-round, and works

[20] EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems,

in close proximity to this watercourse were evaluated as being of high magnitude for aquatic species. However, it was identified that significant impacts were not probable/not likely post-mitigation. The 2013 EIS concludes that water quality effects will not be significant.

The amendments to the windfarm substation (approved in December 2020) do not change excavation requirements or movement of soils associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required;
- All effects were evaluated as reversible and temporary in the short-term and impacts were associated with construction phase works.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None - absence of impact sources associated with the proposed amendment

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to construction works or activities for the authorised Upperchurch Windfarm (including movement of soils and machinery, use of hydrocarbons & cement-based compounds; requirements for instream works or culvert works, excavation works, earthworks, groundworks, reinstatement works, and forestry felling at the windfarm site), and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Suir SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Suir SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Suir SAC

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechum* in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat *Taxus baccata* woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.

- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluations of the Other Elements of the Whole UWF Project

– Decrease in instream aquatic habitat quality

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019. Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: Works at, or in close proximity to, watercourses have potential to cause decreases in instream habitat quality directly through instream works and indirectly through sediment laden/contaminated runoff into the watercourse. There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works. 31 no. of the total 32 no. crossings are located within the Suir_SC_030 sub-catchment and 1 no. in the Bilboa_SC_010 sub-catchment (excluded from further consideration as the Bilboa is within the regional River Shannon catchment). Of these 31 no. crossings the Suir_SC_030 sub-catchment, in-stream works will be required at 25 no. of these locations - 5 No. of which were evaluated as having fisheries value.

The spatial extent of such effects will occur within the footprint of the instream works (direct effects), and also downstream of construction works (indirect water quality effects) within the zone of sediment transport. The closest watercourse crossing to the River Suir SAC however is at least 4.3km (WW15).

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (UWF Related Works Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required (5 No.) are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing. This will be completed by over pumping, flume (pipe) or channel diversion methods (UWF Related Works Project Design Measure);
- There will be no direct discharge of pumped water into the watercourse during the works (UWF Related Works Project Design Measure);
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat, and
- Impacts to the watercourse channel are temporary and reversible with reinstatement.
- The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

UWF Grid Connection (authorised)

Impact Magnitude:

Approximately 1.5km of the 110kV UGC exists within an upper headwater tributary of the Clodiagh River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings of one minor watercourse and small drains at existing road bridge and culvert locations. There are 5 No. watercourse crossings within the Clodiagh (Tipperary) River catchment (W64-W68), of which 1 No. have fisheries value (W65). This watercourse crossing is outside the SAC site boundary but upstream hydrologically. No culvert/instream replacement works are required at this location. Trench and joint bay excavation works have potential to cause effects to surface water quality, which can then indirectly affect aquatic habitat quality. The magnitude of the effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character is evaluated as Negligible with regard to availability, diversity and quality of habitat supporting aquatic species.

The potential for decreases in aquatic habitat quality due to additional sedimentation or contamination by fuels, oils or cement is evaluated as having a Negligible magnitude,

Significance of the Impact: No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:

- All watercourse crossings (5 No.) within the River Suir catchment are of a single local surface water body of the upper Clodiagh sub-catchment. The majority of these crossings (4 of 5 No.) have no fisheries value and are classified as drains (Class 4 watercourses) and therefore the potential for downstream water quality effects is limited due to small size and low or absent flows;
- No requirement for instream works within the Clodiagh (Tipperary) sub-catchment of the regional River Suir catchment - only 1 No. crossing of a Class 2 first order stream is required (W65) and there is no requirement to replace the existing culvert at this location; therefore,
- the potential for downstream water quality effects is limited due to small size and low or absent flows with regard to the scale of works within this sub-catchment.
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat.
- Impacts to the watercourse channel are temporary and reversible. The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible; and
- Separation distance to downstream QI's such as Freshwater Pearl Mussel will avoid any adverse effect.
- Application of comprehensive water quality protection Mitigation Measures for UWF Grid Connection through the EMP with supervision by supervised by a member of CIEEM and the Institute of Fisheries Management during all instream works and culvert replacement works (i.e. whether fisheries value or not).

UWF Replacement Forestry (licensed)

Impact Magnitude:

The UWF Replacement Forestry is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. One Class 1 stream flows through the UWF Replacement Forestry lands. Environmental protection measures which form part of the design of the UWF Replacement Forestry include planting by hand, no use of pesticide or fertilizer, no refuelling or storage of fuels onsite, a 10m water setback area, and the planting and management of the site in accordance with Best Practice.

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- Neutral habitat deterioration impacts arising from the UWF Replacement Forestry, as there is no requirement for instream works and no sources of significant sediment creation as planting will be carried out by hand.
- There is no potential for habitat quality impacts, as the riparian strips/grassland adjacent to the existing watercourse will be maintained as part of the forestry layout as a water quality protection measure.
- There is no potential for acidification effects during the growth stage, as the UWF Replacement Forestry will be deciduous in nature.
- There is no risk of pollution events as herbicide or fertilizers will not be used and the use of machinery will be minimal.
- There is no risk of aquatic habitat degradation (as a result of nitrogen deposition) as commercial tree felling will not be required – UWF Replacement Forestry will be a permanent native woodland.

UWF Other Activities

Impact Magnitude:
The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities.
There is no potential for aquatic habitat effects within or ex-situ to the River Suir SAC as there are no instream works or sediment creating activities adjacent to watercourses required as a result of UWF Other Activities including Haul Route Activities or the Upperchurch Hen Harrier Scheme (UHHS). The Upperchurch Hen harrier Scheme is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence upstream or ex-situ to the River Suir SAC. The Activities include all environmental protection measures, including measures for invasive species management and monitoring associated with the Upperchurch Hen Harrier Scheme; as set out in the UWF Grid Connection EIAR 2019 as Appendix 5.6 – See Reference Document 21 of 36. No potential for impacts to aquatic habitats due to tree felling, as no tree felling of conifer plantations is required.
Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:
- No requirement for instream works
- Implementation of Project Design and Best Practice Environmental Measures

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Decrease in instream aquatic habitat quality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendment will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: The watercourse crossing works required for the UWF Grid Connection (68 No. total) are largely located within the River Shannon catchment (63 No.) while the watercourse crossings required for the Upperchurch Windfarm (1 No.) and UWF Related Works (32 No. total) are largely located in the Suir_SC_030 sub-catchment. For the Whole UWF Project, a potential decrease in aquatic habitat quality due to instream/culvert replacement works is identified at a total of **5 No**. watercourses evaluated as having fisheries value – 0 no. for UWF Grid Connection (as no instream works will occur in the regional Suir catchment) and 5 no. for UWF Related Works. The closest watercourse crossing location as part of UWF Related Works is 4.3km upstream hydrologically from the River Suir SAC boundary.
The spatial extent of habitat quality effects arising from Whole UWF Project impacts in the context of the Lower River Suir SAC, due to instream works or water quality contamination, will potentially occur within the footprint of the instream/culvert replacement works, taking account of Project Design measures and implementation of mitigation measures stipulated for individual Project Elements. These effects will be dispersed within the Suir regional catchment – primarily upstream of the European Site. Impact range is located downstream of the lowest point in the waterbody where Whole UWF Project works are required, with reference to the zone of sediment transport.
It is evaluated that the cumulative impact magnitude will be Negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):
No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:
- The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species downstream.
- The low number of watercourses (5 No. in total) with fisheries value and subject to instream/culvert replacement works.
- The spatial extent of effects to watercourse channels will occur within the footprint of the instream works,
- The once off frequency and brief to temporary duration of works within or adjacent to the aquatic habitat.
- Impacts at the works site are temporary and reversible; however, any reduction in habitat quality due to potential downstream siltation effects are considered to be short-term to temporary and not reversible, however;

- This is not considered significant in the context of the conservation objectives around aquatic species and habitat, given the negligible magnitude, project design and separation buffers and distance to the European Site under consideration.

Qualifying Interests

- No effects on QI Habitat Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Old sessile oak woods with Ilex and Blechum in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat Taxus baccata woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.
- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected..

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Activities

– Decrease in instream aquatic habitat quality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 **(reproduced hereunder):**

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:

The elements of the Whole UWF Project which are located in the Suir_SC_030 sub-catchment and which have any potential to result in effects on aquatic habitat quality, are essentially UWF Related works, the magnitude of which is evaluated as negligible, given only 5 no. watercourse crossings are required, all of which are located upstream of the SAC and which will be subject to Project Design measures to avoid adverse effects on European Site Integrity. The magnitude of effects from background agriculture, forestry and turbary is evaluated as negligible. The overall magnitude of cumulative impact is Negligible taking account of the impact evaluations for the Whole UWF Project and those of the Other Activities identified in the wider study area, with cognisance of the aquatic sensitivities in the affected catchments.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Suir SAC**

Rationale for Cumulative Impact Evaluation:

Whole Windfarm Project:

- The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species within the affected catchments downstream.
- The low number of watercourses (5 No. in total) with fisheries value and subject to instream/culvert replacement works.
- The spatial extent of effects to watercourse channels will occur within the footprint of the instream works,
- The once off frequency and brief to temporary duration of works within or adjacent to the aquatic habitat.
- Impacts at the works site are temporary and reversible; however, any reduction in habitat quality due to potential downstream siltation effects are considered to be short-term to temporary and not reversible, however;
- No adverse effects in the context of the conservation objectives around aquatic species and habitat, given the negligible magnitude, project design and separation buffers and distance to the European Site under consideration.
- Application of comprehensive water quality protection measures for UWF Grid Connection through the EMP with supervision by supervised by a member of CIEEM and the Institute of Fisheries Management during all instream works and culvert replacement works (i.e. whether fisheries value or not.

Other Plans or Projects:

- The limited contrast to existing baseline conditions in the context of background agriculture, forestry and turf cutting..

6.6.3.1.2 Effects on QI habitats and/or QI species along Pathways 2, 3, 6 & 8 from changes to flow regime within or ex-situ the Lower River Suir SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: Instream works; culvert replacement works; new crossing structures; movement of soils and machinery; excavation works;
Other Unrelated Project/Activity Cumulative Impact Source: movement of soils and machinery; excavation works;
Impact Pathway: Surface water; Land cover
Impact Description: Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. Potential for direct impacts to channel morphology and geomorphology (bed and banks of watercourses) due to instream worksin watercourses with fisheries value. The potential for indirect effects which would lead to sediment deposition at a scale to alter channel morphology or the flow regime are considered unlikely; with reference to Project Design measures.
Aquatic species are likely to be present in fishery value watercourses at instream construction works locations. Any change in watercourse morphology which affects channel flow regimes can result in cross factor effects on aquatic ecological communities. Aquatic species are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration and the avoidance of barriers to passage; and avoidance of channel constriction during low flow.
Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, or an altered hydrological regime. It may also result in secondary effects on prey item species, which may affect the supporting habitat quality for QI Species.
In instances where this impact occurs outside or ex-situ the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Changes to Flow Regime

Authorised Upperchurch Windfarm

Impact Magnitude:
Construction works will take place in close proximity to 1 No. watercourses with fisheries value. No instream works are required at this location and this watercourse will be crossed using a new clear span bridge, which will avoid the requirement for instream works and preclude direct modification to the flow regime. Changes to flow regime due to sedimentation from nearby construction works will be avoided by the implementation of the Sediment & Erosion Control Plan for the Upperchurch Windfarm during construction works. Magnitude is evaluated as negligible on this basis.
The amendments to the windfarm substation (approved in December 2020) do not change requirements for watercourse crossing works, earthworks or movement of soils associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- No instream works are required on the watercourse crossing within the Upperchurch Windfarm site
- Implementation of the Sediment & Erosion Control Plan.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None- absence of impact sources associated with the proposed amendment

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to the footprint of construction works or activities for the authorised Upperchurch Windfarm (including movement of soils and machinery, excavation works), and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Suir SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Suir SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Suir SAC

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechum* in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat *Taxus baccata* woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.
- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluations of the Other Elements of the Whole UWF Project - Changes to Flow Regime

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects

of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:

Works at, or in close proximity to, watercourses have potential to cause changes to flow regime through instream works and indirectly through sediment laden runoff into the watercourse.

There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works. 31 no. of the total 32 no. crossings are located within the Suir_SC_030 sub-catchment and 1 no. in the Bilboa_SC_010 sub-catchment (regional Lower River Shannon SAC catchment). Of these 31 no. crossings within the Suir_SC_030 sub-catchment, in-stream works will be required at 25 no. of these locations - 5 No. of which were evaluated as having fisheries value. The closest watercourse crossing to the Lower River Suir SAC however is at least 4.3km (WW15). The spatial extent of changes to flow regime effects will occur within the footprint of the instream works and also *immediately* downstream where hydrological flow character is altered due to bank or river bed modification. The potential for indirect effects which would lead to sediment deposition at a scale to alter channel morphology or the flow regime are considered unlikely. Instream works in watercourses with fisheries value (5 No.) relate to 3 temporary crossings for Internal Windfarm Cabling trenching works and/or the installation of a temporary crossing structure, while the remaining 2 No. relate to the installation of permanent crossing structures. The spatial extent of any flow regime effects will occur within the footprint of the instream works, and also immediately downstream where hydrological flow character is altered due to bank or river bed modification. The magnitude of impact is negligible on the downstream SAC.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are mostly small headwater streams;
- The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);
- The limited extent of direct instream works potentially affecting flow,
- The sensitive crossing designs developed following consultation with IFI.
- The brief to temporary duration and reversibility of any effects.

UWF Grid Connection (authorised)

Impact Magnitude:

Works at, or in close proximity to, watercourses have potential to indirectly affect aquatic species and habitats through changes to flow regimes which can be caused directly by morphological changes due to instream works.

Approximately 1.5km of the 110kV UGC exists within an upper headwater tributary of the Clodiagh River catchment. There are 5 No. watercourse crossings within the Clodiagh (Tipperary) River catchment (W64-W68), of which 1 No. have fisheries value, which will not require culvert replacement or instream works. Trench and joint bay excavation works in close proximity to watercourses have potential to result in altered flow regime, which can then indirectly affect aquatic habitat quality.

Only 1 No. watercourse (WC crossing W65) with fisheries value is located within the regional Lower River Suir SAC catchment, outside the site boundary but upstream hydrologically. No new instream/culvert replacement works are required at this location.

The magnitude of effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character is evaluated as Negligible with regard to availability, diversity and quality of habitat supporting aquatic species. Any changes to flow regime due to sedimentation will be negligible with the implementation of Project Design Measures, such as the use of sandbags to avoid the runoff of sediment laden water from construction works areas, the treatment of any water pumped from excavations prior to discharge.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:

- No requirement for instream works, in watercourses with fisheries value, within the Clodiagh (Tipperary) sub-catchment of the regional River Suir catchment;
- Application of comprehensive water quality protection measures for UWF Grid Connection through the EMP with supervision by supervised by a member of CIEEM and the Institute of Fisheries Management during all instream works and culvert replacement works (i.e. whether fisheries value or not);

- There will be no direct discharge of pumped water into the watercourse during the works (Project Design);
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat;
- Impacts to the watercourse channel are temporary and reversible. The duration of any reductions in the quality of downstream habitats due to siltation and/or altered flow regime are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible; and
- It's likely only c.100m of the trench will be excavated in any day with only 1 watercourse crossing being completed in any one day (assumed 1 work crew). Therefore, taking account of the temporary nature and limited locations of the works within the River Suir catchment, all effects will be brief to temporary in nature and reversible.
- All watercourse crossings (5 No.) are within the catchment of a single local surface water body of the upper Clodiagh sub-catchment. The majority of these crossings (4 of 5 No.) have no fisheries value and are classified as drains (Class 4 watercourses) and therefore the potential for downstream altered flow regime effects is limited due to small size and low or absent flows;
- Only 1 No. crossing of a Class 2 first order stream is required (W65) and there is no requirement to replace the existing culvert at this location; therefore, the potential for downstream flow regime effects is limited due to small size and low or absent flows with regard to the scale of works within this sub-catchment.

UWF Replacement Forestry (licensed)

Impact Magnitude:

The UWF Replacement Forestry is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. One Class 1 stream flows through the UWF Replacement Forestry lands. Environmental protection measures which form part of the design of the UWF Replacement Forestry include planting by hand, no use of pesticide or fertilizer, no refuelling or storage of fuels onsite, a 10m water setback are, and the planting and management of the site in accordance with Best Practice. Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- Neutral habitat deterioration impacts arising from the UWF Replacement Forestry, as there is no requirement for instream works and no sources of significant sediment creation as planting will be carried out by hand.
- There is no potential for altered flow regime impacts, as the riparian strips/grassland adjacent to the existing watercourse will be maintained as part of the forestry layout as a water quality protection measure.
- There is no risk of operational alteration to flow regimes as commercial tree felling will not be required – UWF Replacement Forestry will be a permanent native woodland.

UWF Other Activities.

Impact Magnitude:

The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities.

There is no potential for aquatic habitat effects within or ex-situ to the Lower River Suir SAC as there are no instream works or sediment creating activities adjacent to watercourses required as a result of UWF Other Activities including Haul Route Activities or the Upperchurch Hen Harrier Scheme (UHHS). The Upperchurch Hen harrier Scheme is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence upstream or ex-situ to the Lower River Suir SAC. This UWF Other Activities element will include riparian habitat enhancement through planting; however, this will not result in any negative quality effects on watercourse flow regimes.

Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- No requirement for instream works and/or limited works in close proximity to watercourses;
- Absence of negative quality effects from UHHS;
- Implementation of Project Design and Best Practice Environmental Measures

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Changes to Flow Regime

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: A potential decrease in aquatic habitat via changes to flow regime is identified at **5 No**. watercourse crossings where instream works or culvert replacement works are required within watercourses evaluated as having fisheries value – 5 no. for UWF Related Works. . The potential for indirect effects which would lead to sediment deposition at a scale to alter channel morphology or the flow regime are considered unlikely. The spatial extent of such effects will occur within the footprint of the instream works, extending to immediately downstream where hydrological flow character may be altered due to bank or river bed modification, recognising that cumulative effects are widely dispersed within a regional catchment and its respective sub-catchment. Cognisance is also given to Mitigation Measures (UWF Grid Connection) and Project Design measures for the other elements, including reinstatement works and measures for the protection of watercourses during works.

Cumulative magnitude is evaluated as Negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Cumulative Impact Evaluation:

- Instream works potentially affecting the flow regime are required at a limited number of locations; half of which require temporary works and half require permanent instream structures.
- Implementation of Project Design Measures at all stream/culvert crossings, instream works and culvert replacement works locations to minimize effects
- Implementation of the sensitive crossing designs developed following consultation with IFI.
- the use of deflector plates, the equilibrated restoration of flow
- Provision of reinstatement works at new permanent crossings/replaced existing culverts culverts
- Supervision of reinstatement works as part of UWF Grid Connection by a member of CIEEM and the Institute of Fisheries Management.

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Old sessile oak woods with Ilex and Blechum in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat Taxus baccata woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.
- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.

- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Activities

– Changes to Flow Regime

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: The magnitude of effect from the Whole UWF Project is essentially in the order of the UWF Related Works project element, based on 5 no. watercourse crossings with fisheries value required works within or in close proximity – with no adverse effects stemming from the UWF Grid Connection on the Lower River Suir SAC. Given the nature of the watercourses present, the works proposed and the implementation of project design measures there is no likelihood for indirect effects occurring which would lead to sediment deposition at a scale to alter channel morphology or the flow regime.

With respect to other plans or projects considered, agriculture, forestry and turfcutting are essentially background trends which are not expected to change, therefore any contrast to baseline conditions in respect of the Lower River Suir SAC is considered unlikely..

Overall cumulative magnitude is evaluated as negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Suir SAC**

Rationale for Cumulative Impact Evaluation:

Whole UWF Project:

- Instream works potentially affecting the flow regime are required at a limited number of locations; half of which require temporary works and half require permanent instream structures.
- Implementation of Project Design Measures at all stream/culvert crossings, instream works and culvert replacement works locations to minimize effects
- Implementation of the sensitive crossing designs developed following consultation with IFI.
- Provision of reinstatement works at new permanent crossings/replaced existing culverts including: site-specific bank stabilization measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles.

Other Projects or Activities:

- The limited contrast to existing baseline conditions in the context of background agriculture, forestry and turf cutting.

6.6.3.1.3 Effects on QI habitats and/or QI species along Pathways 2, 3, 6 & 8 from Riparian habitat degradation within or ex-situ the Lower River Suir SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: instream works, culvert replacement works; movement of soils and machinery; excavation works; Forestry felling; reinstatement works

Other Unrelated Project/Activity Cumulative Impact Source: Movement of soils and machinery; Excavation works; Reinstatement

Impact Pathway: Soils; Direct contact

Impact Description: The riparian corridor along a watercourse relates to the interface between the aquatic habitat, the bankside vegetation and terrestrial environment. An intact, semi-natural riparian zone has significant beneficial services in the protection of instream aquatic habitat quality, food/nutrient contributions, and temperature regulation. Existing riparian habitat quality within the study area is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.

The removal of, or damage to, riparian vegetation during instream works or excavation/ground clearance works in close proximity to any watercourse has the potential to impact on the quality of riparian habitats which in turn can affect watercourse morphology, shading, bank stability, and nutrient and sediment loading and result in indirect effects on aquatic species.

The magnitude of resultant effects is expected to be higher when this occurs within an SAC as to without, given that effects are naturally localised. However downstream effects may occur to European Sites where suitable connectivity exists especially if riparian habitat degradation ex-situ leads to increased downstream sediment loads, or sufficiently affects upstream spawning habitats etc. which in effect support downstream SAC qualifying interests.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, altered fringing habitat and riparian vegetation such as required for Freshwater Pearl Mussel and Floating River Vegetation, or an altered hydrological regime. It may also result in secondary effects on prey item species, which may affect the supporting habitat quality for QI Species.

In instances where this impact occurs outside or ex-situ the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Riparian habitat degradation

Authorised Upperchurch Windfarm

Impact Magnitude:

As per the 2013 EIS, 1 No. watercourse with fisheries value will be crossed. The crossing method will utilise a clear span bridge design, which will avoid the requirement for instream works; however, works within the riparian zone will be required.

The amendments to the windfarm substation (approved in December 2020) do not change requirements for watercourse crossing works, earthworks or movement of soils or machinery associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- No requirement for instream works on fisheries value watercourses
- Limited scale of works within the riparian corridor at the 1 no. stream crossing
- All effects were evaluated as reversible and temporary in the short-term;
- Riparian habitats within the Upperchurch Windfarm which are directly affected by construction works were not identified as being of significant conservation value.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to construction works or activities for the authorised Upperchurch Windfarm (including movement of soils and machinery, excavation works, reinstatement works and forestry felling), and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Suir SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Suir SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Suir SAC

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechum* in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat *Taxus baccata* woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.
- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.
-

Evaluations of the Other Elements of the Whole UWF Project – Riparian Habitat Degradation

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: Riparian habitat will be affected at 6 No. watercourse crossings identified as having fisheries value, out of a total of 32 watercourse crossings within the construction works area boundary associated with the UWF Related Works. All works are >4km from the Lower River Suir SAC.

The duration of any loss of well-structured riparian habitat impacts will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts will be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible with reinstatement, temporary and short-term and in line with baseline conditions. Bank works are required at watercourse crossing locations; alternatives to riparian clearance are not available.

UWF Grid Connection (authorised)

Impact Magnitude:

Approximately 1.5km of the 110kV UGC exists within an upper headwater tributary of the Clodiagh River catchment and hence the Lower River Suir SAC regional catchment. There are 5 No. watercourse crossings within the Clodiagh (Tipperary) River catchment (W64-W68), of which 1 No. have fisheries value, which will not require culvert replacement or instream works.

Remaining works required are at existing watercourse crossing locations which have low/none fisheries value, and the impact magnitude of riparian habitat degradation on aquatic ecological receptors is evaluated as negligible in the context of the downstream Lower River Suir SAC.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:

- No damage or removal of riparian habitat during cabling works at the 1 No. watercourse with fisheries value – cables will be installed either under or over the watercourse with all works taking place from paved road surfaces.
- No works in the verges or in any watercourse habitat within the River Suir catchment.

UWF Replacement Forestry (licensed)

Impact Magnitude:

The UWF Replacement Forestry is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. One Class 1 stream flows through the UWF Replacement Forestry lands. Environmental protection measures which form part of the design of the UWF Replacement Forestry include planting by hand, no use of pesticide or fertilizer, no refuelling or storage of fuels onsite, a 10m water setback area, and the planting and management of the site in accordance with Best Practice. Magnitude is negligible.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- no requirement for instream works
- no risk of operational alteration to riparian habitat as commercial tree felling will not be required – UWF Replacement Forestry will be a permanent native woodland.

Lower River Suir SAC

Stage 2: Natura Impact Statement

UWF Other Activities

Impact Magnitude:
The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities.
There is no potential for riparian habitat effects within or ex-situ to the Lower River Suir SAC as there are no instream works or sediment creating activities adjacent to watercourses required as a result of UWF Other Activities such as Haul Route Activities. The Upperchurch Hen harrier Scheme is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence upstream or ex-situ to the Lower River Suir SAC. This UWF Other Activities element will include riparian habitat enhancement through planting; however, this will not result in any negative quality effects on watercourse flow regimes. Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:
- No requirement for instream works and/or limited works in close proximity to watercourses;
- Absence of negative quality effects from UHHS;
- Implementation of Project Design and Best Practice Environmental Measures;

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment)
– Riparian habitat degradation

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: Riparian habitat will be affected at **5 No**. watercourses with fisheries value for UWF Related Works, and **1 No**. watercourse with fisheries value for Upperchurch Windfarm which will be associated with bankside works, instream works or culvert replacement works. The cumulative impact magnitude of the Whole UWF Project on the riparian and bankside habitats within the Suir regional catchments is evaluated as Negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Cumulative Impact Evaluation:
- The limited extent of instream works, within defined works areas will reduce the potential spatial area.
- The Class 1 and Class 2 watercourses where in-stream works are required are small, first order streams and therefore are likely to have relatively low flows during July to September which will enable easier access;
- Existing riparian habitat quality within the works areas, which comprise the baseline for evaluation of impact significance, is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at stream crossing locations, limited to the direct footprint of the temporary works areas; alternatives to temporary riparian clearance are not available.
- The duration of the impact are generally once-off, restricted to the period of works within or adjacent to the aquatic habitat; relate to individual watercourses and are thus not subject to sequential project effects.
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible.

Qualifying Interests:
- No effects on QI Habitat Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.

- No effects on QI Habitat Old sessile oak woods with Ilex and Blechum in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat Taxus baccata woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.
- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Activities

– Riparian habitat degradation

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:Whole UWF Project magnitude is based on Riparian habitat being affected at **5 No**. watercourses with fisheries value for UWF Related Works, and **1 No**. watercourse with fisheries value for Upperchurch Windfarm which will be associated with bankside works, instream works or culvert replacement works. The cumulative impact magnitude of the Whole UWF Project on the riparian and bankside habitats within the Suir regional catchments is evaluated as Negligible.
With respect to other plans or projects considered, agriculture, forestry and turfcutting are essentially background trends which are not expected to change, therefore any contrast to baseline conditions in respect of the Lower River Suir SAC is considered unlikely.
Overall cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Suir SAC**

Rationale for Cumulative Impact Evaluation:

Whole UWF Project:

- The limited extent of instream works, within defined works areas will reduce the potential spatial area.
- The Class 1 and Class 2 watercourses where in-stream works are required are small, first order streams and therefore are likely to have relatively low flows during July to September which will enable easier access;
- Existing riparian habitat quality within the works areas, which comprise the baseline for evaluation of impact significance, is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at stream crossing locations, limited to the direct footprint of the temporary works areas; alternatives to temporary riparian clearance are not available.
- The duration of the impact are generally once-off, restricted to the period of works within or adjacent to the aquatic habitat; relate to individual watercourses and are thus not subject to sequential project effects.
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible.

Other Projects or activities:

● The limited contrast to existing baseline conditions in the context of background agriculture, forestry and turf cutting.

6.6.3.1.4 Effects on QI habitats and/or QI species along Pathways 2, 3, 6 & 8 from the Spread of Invasive Aquatic Species within or ex-situ the Lower River Suir SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: watercourse crossing works; instream works; culvert replacement works; excavation works, movement of soils and machinery

Other Unrelated Project/Activity Cumulative Impact Source: Excavation works, movement of soils and machinery

Impact Pathway: Surface water; Movement of soils and machinery

Impact Description: Invasive aquatic species include non-native, terrestrial invasive species such as Japanese knotweed or Himalayan balsam, invasive riparian vegetation (such as Japanese knotweed) and also fish and mobile invertebrate fauna (such as Asian clam, Signal crayfish, or non-native shrimp species). Aquatic invasive species may be introduced to unaffected catchments or spread within infected watercourses during the course of instream works or transported via excavated material by site machinery.

Aquatic invasive species have the potential for significant ecosystem disturbance, disrupting the predator/prey balance or causing habitat disruption within aquatic systems. The spread of aquatic invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream (mobile species and 3rd party transport) and downstream (hydrological transport) within a watercourse, potentially extending throughout the catchment.

Non-native, invasive species potentially affecting the aquatic environment can also include terrestrial species which compromise bank integrity, riparian structural diversity and riparian invertebrate production contributing to habitat diversity and feeding inputs within the aquatic system.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, an altered hydrological regime and through secondary effects on prey item species, affect the supporting habitat quality for QI Species. Specific Qualifying Interests of the Lower River Suir SAC such as Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6340], Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0], *Taxus baccata* woods of the British Isles [91J0], or White-clawed Crayfish have Conservation Objective attributes and targets around preventing increases in the presence of negative indicator species, often invasive alien species.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

The management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plan which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Spread of Aquatic Invasive Species

Authorised Upperchurch Windfarm

Impact Magnitude:

There is the potential for introduction of non-native, invasive aquatic species at the 1 No. watercourse crossing associated with the Upperchurch Windfarm works.

The amendments to the windfarm substation (approved in December 2020) do not change requirements for watercourse crossing works, earthworks or movement of soils or machinery associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species, in the absence of mitigation. However, it was identified that significant impacts were not probable/likely.
- Baseline conditions indicated that the aquatic species were present year-round and impacts were associated with construction phase works.
- All effects were evaluated as reversible and temporary in the short-term; however, in the case of potential spread of aquatic invasive species, there is the potential for long-term, irreversible impacts,
- Best practice biosecurity and invasive species control measures will be implemented during construction works to prevent the spread of invasive species, which will meet regulatory requirements.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to construction works or activities for the authorised Upperchurch Windfarm (including watercourse crossing works, use and movement of machinery, earthworks, groundworks or reinstatement works) or to volumes or transport delivery routes for construction materials associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Suir SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Suir SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Suir SAC

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechum* in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat *Taxus baccata* woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.
- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.

- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluations of the Other Elements of the Whole UWF Project - Spread of Aquatic Invasive Species

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
There is the potential for introduction of non-native, invasive aquatic species at 31 No. watercourse crossings associated with the UWF Related Works within the Suir_SC_030 sub-catchment.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species is evaluated as non-reversible, however;
- The implementation of the Invasive Species Management Plan, including best practice biosecurity protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring.

UWF Grid Connection (authorised)

Impact Magnitude:
There is the potential for introduction of non-native, invasive species at all **5** No. watercourse crossing points associated with the 110kV UGC works within the Lower River Suir SAC regional catchment, due to the carrying out of works at or in close proximity to watercourses, and due to the movement of machinery over watercourses at existing road crossings; these include the transport, spread or introduction of terrestrial invasive species such as Japanese knotweed or Himalayan balsam, where these species occur widely within the study area. The potential for introduction of aquatic invasive species including mobile invertebrate fauna (such as Asian clam, Signal crayfish, or non-native shrimp species) or invasive riparian vegetation (such as Japanese knotweed), is limited to the instream works areas of which there is just 1 No. (Class 4 drain) within the River Suir regional catchment. All watercourse crossing location within the River Suir regional catchment are located outside and upstream of the SAC boundary.
The management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plan which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:
- The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, spread of aquatic invasive species is evaluated as non-reversible; however
- the implementation of the Invasive Species Management Plan and adherence to best practice Biosecurity Protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring.

UWF Replacement Forestry (licensed)

Impact Magnitude:
The UWF Replacement Forestry is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. One Class 1 stream flows through the UWF Replacement Forestry lands. Environmental protection measures which form part of the design of the UWF Replacement Forestry include planting by hand – no use of machinery, a 10m water setback area, and the planting and management of the site in accordance with Best Practice. Magnitude is negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- Neutral habitat deterioration impacts arising from the UWF Replacement Forestry, as there is no requirement for instream works and no sources of significant invasive species introduction as planting will be carried out by hand.
- There is no risk of operational alteration via the introduction of invasive species is avoided as commercial tree felling will not be required – UWF Replacement Forestry will be a permanent native woodland.

UWF Other Activities

Impact Magnitude:
The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. There is no potential habitat effects via the introduction of invasive species within or ex-situ to the Lower River Suir SAC as there are no instream works or activities adjacent to watercourses required as a result of UWF Other Activities such as Haul Route Activities. The Upperchurch Hen harrier Scheme is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence upstream or ex-situ to the Lower River Suir SAC. This UWF Other Activities element will include riparian habitat enhancement through planting; however, this will not result in any negative quality effects on the aquatic environment through the introduction of invasive species.
All UWF Other Activities will proceed in line with Best Practice measures for the prevention of the introduction or spread of invasive species.
Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- Absence of pathways from activities to the Lower River Suir SAC, and;
- Implementation of measures in respect of invasive species management and monitoring.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Spread of Aquatic Invasive Species

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at **37 No**. watercourse crossing works locations, within the Lower River Suir SAC regional catchment, associated with the Whole UWF Project. The impact magnitude is evaluated as Medium due to the presence of invasive species in the study area, established as the baseline condition and thus contributing to the risk of spread where infestations from one location to another.
However all watercourse crossing locations are located outside and upstream of the Lower River Suir SAC boundary and the management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plans for Upperchurch Windfarm, UWF Related Works and UWF Grid Connection. The Invasive Species Management Plans include Best Practice biosecurity measures and supervision by an invasive species specialist, this will ensure that the spread of invasive species is avoided.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Cumulative Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species are evaluated as non-reversible, however
- The implementation of the Invasive Species Management Plans, which include best practice Biosecurity Protocols (IFI, 2010).

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Old sessile oak woods with Ilex and Blechum in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat Taxus baccata woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.
- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.

No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Activities

– Spread of Aquatic Invasive Species

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:There is the potential for introduction of non-native, invasive aquatic species at 37 No. watercourse crossing works locations, associated with the Whole UWF Project. The impact magnitude is evaluated as Medium due to the presence of invasive species throughout the study area, established as the baseline condition and thus contributing to the risk of spread where infestations from one location to another.

With regard to Other projects, the effects from agriculture, turbary and forestry are evaluated as negligible in magnitude as no contrast is expected in the context of background trends.

However the management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plans which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided, and therefore it is considered that this impact is unlikely to occur.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Suir SAC**

Rationale for Cumulative Impact Evaluation:

Whole UWF Project:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the Whole UWF Project, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts

Lower River Suir SAC

Stage 2: Natura Impact Statement

once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.

- In this respect, the spread of aquatic invasive species are evaluated as non-reversible, however
- The implementation of the Invasive Species Management Plan for Upperchurch Windfarm, UWF Related Works and UWF Grid Connection, including best practice biosecurity protocols (IFI, 2010), will ensure that there is no likelihood of this effect occurring.
- In addition, the construction of the other projects under consideration, will be obliged to meet the requirements set out in any described EMP, in addition to its statutory requirements with regard to the introduction or spread of invasive species as set out in the European Communities (Birds and Natural Habitats) Regulations 2011, with specific reference to species listed in Annex III of those regulations.

Other Projects or Activities:

- The limited contrast to existing baseline conditions in the context of background agriculture, forestry and turf cutting.

6.6.3.2 Evaluation of SAC Impacts 4, 5 & 7

6.6.3.2.1 Effects on QI species (Fisheries and Other Species) along Pathways 4 from Direct mortality, ex-situ the Lower River Suir SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: Instream works, culvert replacement works; operating machinery; excavation works; reinstatement

Other Unrelated Project/Activity Cumulative Impact Source: operating machinery; excavation works; reinstatement

Impact Pathway: Direct contact;

Impact Description:

Although Fish are likely to mobilise outside of their territories due to human disturbance, and return once the disturbance effect diminishes some individuals may remain, and in the absence of intervention be subject to contact related pathways for mortality. The extent of mortality of aquatic QI ecological receptors, i.e. fish, will be limited to the direct footprint of any instream works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations – i.e. Class 1 or Class 2 watercourses. Any mortality is irreversible.

Instream works and machinery operation within or in close proximity to any (i.e. *ex-situ*) upstream, hydrologically connected watercourse, has the potential to directly injure or kill salmonid fish and aquatic species within fish-bearing streams, which in turn interact with the natural functions of the downstream SAC.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as distribution and numbers of adults and/or juveniles and through secondary effects on prey item species, affect the supporting habitat quality or in some instances the availability of host or prey item species, for other QI Species.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Fisheries, Direct Mortality

Authorised Upperchurch Windfarm

Impact Magnitude: None:

1 No. watercourse with fisheries value occurs within the footprint of the Upperchurch Windfarm site. This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Mortality effects are limited to the construction works for the new bridge along with the subsequent use of the new bridge throughout the construction period.

The amendments to the windfarm substation (approved in December 2020) do not change requirements for watercourse crossing works, earthworks, reinstatement works or movement of machinery associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species; however, it was identified that significant impacts were not probable/likely post-mitigation. A clear-span bridge will be used at WW2 and therefore no in-stream works are required; no mortality is envisaged.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None - absence of impact sources associated with the proposed amendment

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any additional instream works or culvert replacement works; and will not result in changes to construction activity (including use of machinery, earthworks, groundworks or reinstatement works) associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Suir SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Suir SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Suir SAC

Qualifying Interests:

- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.

Evaluations of the Other Elements of the Whole UWF Project - Fisheries, Direct Mortality

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
Of the 31 No. watercourse crossings within the UWF Related Works construction works area boundary (in the River Suir catchment), 6 No**.** have been evaluated to have fisheries value. Of these 6 No. watercourses, 5 No. will be subject to instream works (the remaining 1 no. crossing WW2 will use a clear span structure (part of Upperchurch Windfarm works) with no requirement for instream works). None of the 31 no. watercourse crossings referenced are within the SAC, and the closest is 4.3km hydrologically upstream. Any fish present are likely to be exposed to mortality pathways for between 1 – 2 days during instream works. The frequency of these disturbance effects is once for half of the locations (cables trenches with or without new permanent culverts) and twice for the remaining locations (temporary culverts; once for installation and once for removal). However, Project Design measures will be implemented to translocate fish prior to instream works.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- All fish will be translocated to suitable habitat in immediate proximity downstream, within the same watercourse prior to works (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);

UWF Grid Connection (authorised)

Impact Magnitude:
Direct mortality of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works or culvert replacement works and construction works adjacent to watercourses and over existing crossing structures.
No instream works (within watercourses with fisheries value) will occur within the Lower River Suir SAC. In the Suir_SC_030 sub-catchment, upstream from the Lower River Suir SAC, the UWF Grid Connection does not require any instream works, or culvert replacement works to existing culverts on watercourses with fisheries value. Magnitude is considered to be negligible.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:
- No instream works will take place within the SAC;
- No instream works (in watercourses with fisheries value) will take place, upstream of the SAC, but within the regional sub-catchment of the SAC.

UWF Replacement Forestry (licensed)

Impact Magnitude: No instream works will take place as part of UWF Replacement Forestry

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- Absence of Pathways

UWF Other Activities

Impact magnitude:
The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. There is no potential for aquatic receptor mortality effects within or ex-situ to the Lower River Suir SAC as there are no instream works required as a result of UWF Other Activities including Haul Route Activities or the Upperchurch Hen Harrier Scheme (UHHS). No potential for mortality effects to aquatic receptors due to the small scale of activities and no activities within the riparian corridor of Class 1 or Class 2 watercourses. The Upperchurch Hen harrier Scheme is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence upstream or ex-situ to the Lower River Suir SAC. No potential exists for mortality related impacts to aquatic receptors, as there are no instream works or activities adjacent to watercourses required as a result of UWF Other Activities.
Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- Absence of pathways for mortality.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Fisheries, Direct Mortality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: Direct mortality of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works or culvert replacement works and directly upstream and downstream of all crossings, temporary and permanent instream works structures, bank-side works and construction works adjacent to watercourses and over existing crossing structures. The potential for the Whole UWF Project to cause effects relates to those watercourses with fisheries value which will be subject to instream works or works in close proximity for UWF Grid Connection, Upperchurch Windfarm and UWF Related Works. In total there are **5 No.** instream works locations (all UWF Related Works), where instream works in fish-bearing streams are required, all of which will be sensitive to disturbance. However, at the local level in the context of individual receptors, mortality will be limited to the affected stretch of watercourse, without cumulative population-level impacts at a watercourse or catchment level. Neither UWF Replacement Forestry nor UWF Other Activities will require any

instream works, and works in close proximity will be small in scale; it is therefore evaluated that the magnitude of any cumulative mortality impacts will be negligible. In addition, Project Design Measures will avoid mortality of aquatic receptors.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse, and the translocation of fish, prior to the in-stream works commencing (Project Design Measure);
- The low number of watercourses (5 No. in total) with fisheries value and subject to instream/culvert replacement works.

Qualifying Interests:

- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Activities

– Fisheries, Direct Mortality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: In total there are 5 No. instream works locations where instream works in fish-bearing streams are required for elements of the Whole UWF Project (all UWF Related Works), all of which will be sensitive to Mortality. However, at the local level in the context of individual receptors, mortality will be limited to the affected stretch of watercourse, without cumulative population-level impacts at a watercourse or catchment level. Project Design Measures will avoid mortality of aquatic receptors.

In relation to other projects, the magnitude of any potential cumulative effects is evaluated as negligible, with agriculture, forestry and turf-cutting on-going and form part of the baseline conditions, with no material changes in practices expected or planned in the area.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Suir SAC**

Rationale for Impact Evaluation:

Whole UWF Project:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse, and the translocation of fish, prior to the in-stream works commencing (Project Design Measure);
- The low number of watercourses (5 No. in total) with fisheries value and subject to instream works.

Other Projects or Activities:

- The limited contrast to existing baseline conditions in the context of background agriculture, forestry and turf cutting.

6.6.3.2.2 Effects on QI species (Fisheries and Other Species) along Pathways 5 & 7 from Disturbance or Displacement within or ex-situ the Lower River Suir SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: Instream works, culvert replacement works; operating machinery; excavation works; noise and human disturbance; reinstatement works

Other Unrelated Project/Activity Cumulative Impact Source: operating machinery; excavation works; noise and human disturbance; reinstatement works

Impact Pathway: Surface water; Direct contact; Ground and air vibrations

Impact Description: Instream works and machinery operation within or in close proximity to any watercourse either comprising natural locations within the SAC or ex-situ supporting locations upstream, has the potential to directly disturb or displace salmonid fish and aquatic species within fish-bearing streams, or sensitive aquatic receptors. Fish are likely to mobilise outside of their territories due to human disturbance, but will return once the disturbance effect diminishes (i.e. brief temporary effect). The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any instream works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations – i.e. Class 1 or Class 2 watercourses either within or ex-situ the SAC. Disturbance or displacement effects will be brief to temporary in nature, lasting for the duration of works at or in close proximity to Class 1 or Class 2 watercourses.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as distribution and numbers of adults and/or juveniles and through secondary effects on prey item species, or availability of host species for other QI Species.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting species for downstream but ecologically connected Qualifying Interest (QI) species, thus affecting Site Integrity/Conservation Objectives similarly.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Fisheries, Disturbance or displacement

Authorised Upperchurch Windfarm

Impact Magnitude: None:

1 No. watercourse with fisheries value occurs within the footprint of the Upperchurch Windfarm site. This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Disturbance effects are limited to the construction works for the new bridge along with the subsequent use of the new bridge throughout the construction period.

The amendments to the windfarm substation (approved in December 2020) do not change requirements for watercourse crossing works, earthworks, reinstatement works, presence of personnel or movement of machinery associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species; however, it was identified that significant impacts were not probable/likely post-mitigation. A clear-span bridge will be used at WW2 and therefore no in-stream works are required; disturbance will be limited to the immediate works area.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any any additional instream works or culvert replacement works; and will not result in changes to construction activity (including use of machinery, earthworks, groundworks or reinstatement works) or construction personnel associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Suir SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Suir SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Suir SAC

Qualifying Interests:

- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.

Evaluations of the Other Elements of the Whole UWF Project - Fisheries, Disturbance or displacement

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
Of the 32 No. watercourse crossings within the UWF Related Works construction works area boundary, **6 No.** have been evaluated to have fisheries value. Of these 6 No. watercourses, 5 No. will be subject to instream works (the remaining 1 no. crossing WW2 will use a clear span structure (part of Upperchurch Windfarm works) with no requirement for instream works).
Any fish present are likely to be affected for between 1 – 2 days during instream works. The frequency of these disturbance effects is once for half of the locations (cables trenches with or without new permanent culverts) and twice for the remaining locations (temporary culverts; once for installation and once for removal).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- All fish will be translocated to suitable habitat in immediate proximity downstream, within the same watercourse prior to works (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
- The singular frequency of any disturbance events at half of the locations, and;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

UWF Grid Connection (authorised)

Impact Magnitude:
Of the 68 No. watercourse crossings required for the UWF Grid Connection, 5 No. are located within the catchment of the Lower River Suir SAC. Of the 5 No. watercourses, only one of these (W65) has been evaluated to have fisheries value.
The installation of the 110kV UGC at W65 will not involve instream works or culvert replacement works as the cables will be installed either under or over the existing structure, therefore the magnitude of disturbance effects at this location only relates to works in the public road pavements and is evaluated as Negligible. There may be occasional, very short duration disturbance to fish populations utilising habitat beneath the bridge; however, this will not result in displacement, loss of territory, or holding habitat.
Approximately 1.5km of the 110kV UGC exists within an upper headwater tributary of the Clodiagh River catchment. Authorised works including trench excavation, and resurfacing occurring within the Lower River Suir SAC regional catchment (may give rise to disturbance to fish and aquatic biodiversity receptors present within Class 1 and Class 2 watercourses over a period of c.1 – 2 days at each crossing location. The frequency of these disturbance effects is once only for cables trenches with or without new permanent culverts.
Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:

- No instream works are required at W65;
- The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the works occurring in public road pavements;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

UWF Replacement Forestry (licensed)

Impact Magnitude: None: No instream works will take place as part of UWF Replacement Forestry. Implementation of 10m set back buffer area.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- Absence of Pathways

UWF Other Activities

Impact magnitude:
The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. There is no potential for aquatic receptor disturbance effects within or ex-situ to the Lower River Suir SAC as there are no instream works required as a result of UWF Other Activities including Haul Route Activities or the Upperchurch Hen Harrier Scheme (UHHS). No potential for disturbance effects to aquatic receptors due to the small scale of activities and no activities within the riparian corridor of Class 1 or Class 2 watercourses. The Upperchurch Hen harrier Scheme is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence upstream or ex-situ to the Lower River Suir SAC. No potential exists for disturbance related impacts to aquatic receptors, as there are no instream works or activities adjacent to watercourses required as a result of UWF Other Activities.
Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- Absence of pathways for disturbance

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Fisheries, Disturbance or displacement

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: Direct disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works or culvert replacement works and directly upstream and downstream of all crossings, temporary and permanent instream works structures, bank-side works and construction works adjacent to watercourses and over existing crossing structures. In total there are 5 No. instream works locations (all UWF Related Works) where instream works/culvert replacement works in fish-bearing streams are required, all of which will be sensitive to disturbance. However, at the local level in the context of individual receptors, temporary displacement will be limited to the affected stretch of watercourse, without cumulative population-level impacts at a watercourse or catchment level. Disturbance may also occur at other watercourse crossing points due to works in close proximity however this is brief.

Overall impact magnitude is negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse, and the translocation of fish, prior to the in-stream works commencing (Project Design Measure);
- The linear nature of the UWF Grid Connection 110kV UGC works over a large c.23km latitudinal distance;
- The low number of watercourses (5 No.) with fisheries value *and* subject to instream works.
- The frequency of disturbance effects will be once for all 110kV UGC cables trenches at crossing locations with or without potential culvert replacement;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

Qualifying Interests:

- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Activities

– Fisheries, Disturbance or displacement

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:: In respect of the Whole UWF project, in total there are 5 No. instream works locations associated with UWF Related Works, all *outside* the SAC, where instream works/culvert replacement works in fish-bearing streams are required, all of which will be sensitive to disturbance. However, at the local level in the context of individual receptors, temporary displacement will be limited to the affected stretch of watercourse, without cumulative population-level impacts at a watercourse or catchment level. Disturbance may also occur at other watercourse crossing points due to works in close proximity however this is brief. Magnitude is negligible.

For Other Projects or Activities, with regard to background trends in Agriculture, Forestry and Turbary, no contrast or material change is expected. Overall cumulative magnitude is also negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Suir SAC**
Rationale for Impact Evaluation: Whole UWF Project ● In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure); ● The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure); ● The in-stream works will not be undertaken without isolation of flow within the watercourse, and the translocation of fish, prior to the in-stream works commencing (Project Design Measure); ● The linear nature of the UWF Grid Connection 110kV UGC works over a large c.23km latitudinal distance; ● The low number of watercourses (5 No. in total) with fisheries value and subject to instream/culvert replacement works. ● The frequency of disturbance effects will be once for all 110kV UGC cables trenches at crossing locations with or without potential culvert replacement; ● The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible. Other Projects or Activities ● The limited contrast to existing baseline conditions in the context of background agriculture, forestry and turf cutting.

6.6.3.2.3 Effects on QI species (Otter) along Pathways 4 from Direct mortality ex-situ the Lower River Suir SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: Instream works, culvert replacement works; operating machinery; excavation works; reinstatement works

Other Unrelated Project/Activity Cumulative Impact Source: operating machinery; excavation works; reinstatement

Impact Pathway: Direct Contact

Impact Description: Otter are rated as a very high sensitivity receptor (based on International importance ratings) and may be sensitive to mortality through inadvertent collision with moving vehicles or machinery, in particular during hours of darkness. As no active holts were located within 300m (upstream or downstream) of works locations in proximity to suitable Otter habitat (i.e. at watercourse crossing locations) then effects are reduced to potential mortality of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors and /or whilst crossing roads in close proximity to proposed works. Many of the watercourses present whilst not within the SAC boundary, form the upper reaches of or are hydrologically connected to the Lower River Suir SAC which includes Otter as a Qualifying Interest.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as a decline in range and/or distribution and numbers of individuals within the Lower River Suir SAC.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on connected or supporting populations for downstream but ecologically connected Qualifying Interest (QI) species, thus affecting Site Integrity/Conservation Objectives similarly.

These effects are substantially reduced by an adherence to Project Design Measures (UWF Grid Connection, UWF Related Works): i.e. completing works during daylight hours only as part of Project Design; all works will be completed in line with the traffic management plan which forms part of the accompanying EMPs and traffic movements will be limited in respect of refuelling near watercourses;), in addition to specific measures around the protection of Otter, such as confirmatory surveys, the limiting of works within 150m of any confirmed active Otter holtsand the establishment of a prohibited area associated with confirmed active Otter holts ; Traffic Management measures (vehicular speeds) will also reduce potential collision mortality.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Otter, Mortality

Authorised Upperchurch Windfarm

Impact Magnitude: No Otter were recorded during windfarm surveys; All work locations are outside the SAC boundary therefore, the impact magnitude of any disturbance is expected to be Negligible.

The amendments to the windfarm substation (approved in December 2020) do not change requirements for watercourse crossing works, earthworks, reinstatement works or movement of machinery associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effects on European Site Integrity.

Rationale for Impact Evaluation:

- No active holts or resting places were recorded in baseline studies for the windfarm;
- watercourses in the windfarm area generally comprise drains which have marginal habitat value to otter and;
- works will be of temporary duration.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any additional instream works or culvert replacement works; and will not result in changes to construction activity (including use of machinery, earthworks, groundworks or reinstatement works) associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Suir SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Suir SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Suir SAC

Qualifying Interests:

- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluations of the Other Elements of the Whole UWF Project - Otter, Mortality

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: 32 No. watercourse crossings in total are required for UWF Related Works with instream works required at 25 No. of these crossings – all outside the SAC boundary with the closest watercourse crossing location ca.4.3km upstream from the SAC. Due to 75% of these watercourses being drains or marginal watercourses, the absence of otter holts within 150m of the crossing points, and separation distance the impact magnitude is expected to be Negligible

Significance of the Impact: No adverse effects on European Site Integrity.

Rationale for Impact Evaluation:

- Application of project design measures for the protection of Otter,
- No active holts were identified overlapping the construction area boundaries or within 150m, and;
- Works will take place during daylight hours only, and;
- Be of brief-temporary duration.

UWF Grid Connection (authorised)

Impact Magnitude:
No evidence of Otter was found within the regional Lower River Suir SAC catchment. 5 no. watercourse crossings (W64-W68 inclusive) are pertinent for consideration however none of these include instream works in a watercourse with fisheries value – all are outside the SAC boundary at significant distances upstream (ca.14km).
Considering the absence of Otter records, and absence of instream works requirements, the temporary duration of works at watercourse crossings, the scale of the authorised works, along with the project design measures in place during works, the magnitude of impact in relation to mortality of Otter is expected to be negligible.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:
- The very high sensitivity rating of the species, and Negligible magnitude of impact;
- No Recorded Otter evidence;
- No Holts or resting places occur in close proximity, and;
- Works will take place during daylight hours, with;
- Very slight contrast to existing baseline conditions is expected, given the majority of works take place in an existing road or paved surface subject to passage of traffic, to which Otter will be habituated;
- The brief-temporary duration of disturbance events and any corresponding effect, with
- Effects expected to be reversible, and;
- Project design measures to avoid/reduce effects also in place, including at all watercourse crossing locations.

UWF Replacement Forestry (licensed)

Impact Magnitude: No active holts or resting places were recorded in baseline studies and all planting will be done by hand. The UWF Replacement Forestry is located outside the SAC and at a substantial distance upstream. Therefore impact magnitude is expected to be Negligible.

Significance of the Impact: No adverse effects on European Site Integrity.

Rationale for Impact Evaluation:
- No active holts or resting places were recorded in baseline studies, and;
- All planting will be done by hand, and;
- Undertaken during daylight hours, and
- Of temporary duration;
- No significant contrast to baseline conditions is expected.

UWF Other Activities

Impact Magnitude:
No otter holts or resting places were recorded at Haul Route Activity locations, and the locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, are all outside the SAC, no upgrades to watercourse crossings or instream works will be required, and activities will all be of brief duration (including riparian enhancement as part of UHHS) and only during daylight hours. Therefore, the impact magnitude is evaluated to be Negligible

Significance of the Impact: No adverse effects on European Site Integrity.

Rationale for Impact Evaluation:
- No otter holts or resting places were recorded at Haul Route Activity locations, and;
- Absence of instream works;
- Locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours;
- The offsetting effects of long-term management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing Otter habitat – including the enhancement of riparian corridors.
- The low reversibility of the above described management.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Otter, Mortality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: Construction works involving the use of machinery and excavation work at watercourse crossing points (both existing and new crossing points) will occur within the River Suir catchment. There is potential to cause mortality of otter at larger watercourse crossing points. However most of these larger watercourses occur along the UWF Grid Connection within the regional Shannon catchment, whereas the watercourses on the UWF Grid Connection where it is located within the regional River Suir Catchment, on the UWF Related Works and Upperchurch Windfarm sites are mainly drains and larger drains/watercourses with marginal habitat value to otter – reflected in baseline records. Sequential effects could occur where Otters foraging or transiting along watercourses

experience multiple sources of mortality in quick succession such as encountering work crews/vehicles undertaking construction activities.
In relation to in-combination effects of the Whole UWF Project on the Lower River Suir SAC, there is no potential for cumulative additive effects to Otters from both the UWF Related Works and the Upperchurch Windfarm due to the absence of Otter recorded at the watercourses within these sites. There is no potential for cumulative effects of the UWF Replacement Forestry with the Other Elements due to the Neutral effect of UWF Replacement Forestry. The magnitude of the in-combination effect of the Whole UWF Project, where considered in its entirety is in the order of UWF Related Works - i.e. Negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:

- The absence of Otter records from UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm study areas;
- The absence of Otter records at the UWF Grid Connection locations within the regional River Suir catchment (all outside the SAC);
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;

Qualifying Interests:

- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Activities

– Otter, Mortality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:
Impact magnitude from the Whole UWF Project is negligible and essentially in the order of effects from the UWF Related Works element. Pathways for effects to the Lower River Suir SAC appear limited due to the absence of Otter records within these watercourses forming upper reaches of the River Suir outside the SAC.
In relation to other plans and projects, agriculture, forestry and turf-cutting are not expected to be materially different from the existing baseline.
Overall cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Suir SAC**

Rationale for Impact Evaluation:

Whole UWF Project:

- The absence of Otter records from UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm study areas;
- The absence of Otter records at the UWF Grid Connection locations within the regional River Suir catchment (all outside the SAC)
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;

Other Projects or Activities:

- The limited contrast to existing baseline conditions in the context of background agriculture, forestry and turf cutting..

6.6.3.2.4 Effects on QI species (Otter) along Pathways 5 & 7 from Disturbance / Displacement, within or ex-situ the Lower River Suir SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: noise and human disturbance; visual intrusion

Other Unrelated Project/Activity Cumulative Impact Source: Noise and human disturbance; Visual Intrusion

Impact Pathway: Air and visibility

Impact Description: Otter are rated as a very high sensitivity receptor (based on International importance ratings) and do not tolerate disturbance at or near holts (breeding dens) that are in active use (breeding may occur at any time of the year, but most likely during the Summer/early Autumn period). When Otters are not breeding, records suggest that Otters are less sensitive to human disturbance (Chanin, 2013). As no active holts were located within 300m (upstream or downstream) of Whole UWF Project works locations in proximity to suitable Otter habitat (i.e. at watercourse crossing locations) then effects are reduced to disturbance/displacement of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors. This could include the disturbance of animals at resting places (couches). It is also noted that Watercourses are present which form part of or are hydrologically connected to European Sites (SAC's) suggesting the potential for secondary effects on this QI species both within and ex-situ the European Site under consideration.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as a decline in range and/or distribution and numbers of individuals within the Lower River Suir SAC catchment.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude ,degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on connected or supporting populations for downstream but ecologically connected Otter.

These effects are reduced by an adherence to Project Design measures (UWF Grid Connection, UWF Related Works): i.e. completing works during daylight hours only; All works will be completed in line with the traffic management plan which forms part of the accompanying EMP and traffic movements will be limited in respect of refuelling near watercourses; in addition to specific measures around the protection of Otter, such as confirmatory surveys, the limiting of works within 150m of any confirmed active Otter holts and the establishment of a prohibited area associated with confirmed active Otter holts.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Otter, Disturbance / Displacement

Authorised Upperchurch Windfarm

Impact Magnitude: No Otter were recorded during windfarm surveys; All work locations are outside the SAC boundary therefore, the impact magnitude of any disturbance is expected to be Negligible.
The amendments to the windfarm substation (approved in December 2020) do not change requirements for personnel or works locations associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- No active holts or resting places were recorded in baseline studies for the windfarm;
- watercourses in the windfarm area generally comprise drains which have marginal habitat value to otter and;
- works will be of temporary duration..

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to the levels of noise, human disturbance or visual intrusion during construction works as the amendment will not result in any changes to the levels, duration, intensity or locations of construction activities associated with the authorised windfarm and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Suir SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Suir SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Suir SAC

Qualifying Interests:

- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluations of the Other Elements of the Whole UWF Project – Otter, Disturbance / Displacement

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: 32 No. watercourse crossings in total are required for UWF Related Works with instream works required at 25 No. of these crossings – all outside the SAC boundary with the closest watercourse crossing location ca.4.3km upstream from the SAC. Due to 75% of these watercourses being drains or marginal watercourses, the absence of otter holts within 150m of the crossing points, and separation distance the impact magnitude is expected to be Negligible

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- Absence of Otter records;
- Application of project design measures for the protection of Otter,
- No active holts were identified overlapping the construction area boundaries or within 150m, and;
- Works will take place during daylight hours only, and;
- Be of brief-temporary duration.

UWF Grid Connection (authorised)

Impact Magnitude: No evidence of Otter was found within the regional Lower River Suir SAC catchment. 5 no. watercourse crossings (W64-W68 inclusive) are pertinent for consideration however none of these include instream works in a watercourse with fisheries (Otter prey items) value – all are outside the SAC boundary at significant distances upstream (ca.14km).
Considering the absence of Otter records, and absence of instream works requirements, the temporary duration of works at watercourse crossings, the scale of the authorised works, along with the project design measures in place during works, the magnitude of impact in relation to disturbance or displacement of Otter is expected to be negligible.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:
- The very high sensitivity rating of the species, and Negligible magnitude of impact;
- No Recorded Otter evidence in close proximity to 5 identified crossings, none of which include new instream works or culvert replacement works in a watercourse with fisheries value;
- No Holts or resting places occur in close proximity, and;

- Works will take place during daylight hours only , with;
- Very slight contrast to existing baseline conditions is expected, given the majority of works take place in an existing road or paved surface subject to heavy passage of traffic, to which Otter will be habituated;
- The brief-temporary duration of disturbance events and any corresponding effect, with
- Effects expected to be reversible, and;
- Mitigation Measures to avoid/reduce effects also in place, including at all watercourse crossing locations.

UWF Replacement Forestry (licensed)

Impact Magnitude: No active holts or resting places were recorded in baseline studies and all planting will be done by hand. The UWF Replacement Forestry is all located outside the SAC at a substantial distance upstream. Therefore impact magnitude is expected to be Negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- No active holts or resting places were recorded in baseline studies, and;
- All planting will be done by hand, and;
- Undertaken during daylight hours, and
- Of temporary duration;
- No significant contrast to baseline conditions is expected.
- Any effect will be reversible, given the low magnitude of source disturbance.

UWF Other Activities

Impact Magnitude:
No otter holts or resting places were recorded at Haul Route Activity locations, and the locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, are all outside the SAC, no upgrades to watercourse crossings or instream works will be required, and activities will all be of brief duration (including riparian enhancement as part of UHHS) and only during daylight hours. Therefore, the impact magnitude is evaluated to be Negligible

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- No otter holts or resting places were recorded at Haul Route Activity locations, and;
- Locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours;
- The positive effects of long-term management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing Otter habitat – including the enhancement of riparian corridors.
- The low reversibility of the above described management.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Otter, Disturbance / Displacement

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: Construction works involving the use of machinery and excavation work at watercourse crossing points (both existing and new crossing points) will occur within the River Suir catchment. There is potential to cause disturbance or displacement of otter at larger watercourse crossing points. However all of these larger watercourses occur along the UWF Grid Connection within the regional Shannon catchment, whereas the watercourses on the UWF Grid Connection where it is located within the regional River Suir Catchment, and on the UWF Related Works and Upperchurch Windfarm sites are mainly drains and larger drains/watercourses with marginal habitat value to otter – reflected in baseline records. Sequential effects could occur where Otters foraging or transiting along watercourses experience multiple sources of instruction/disturbance in quick succession such as encountering work crews undertaking construction activities.

In relation to in-combination effects of the Whole UWF Project on the Lower River Suir SAC, there is no potential for cumulative additive effects to Otters from both the UWF Related Works and the Upperchurch Windfarm due to the absence of Otter recorded at the watercourses within these sites. There is no potential for cumulative effects of the UWF Replacement Forestry with the Other Elements due to the Neutral effect of UWF Replacement Forestry. The magnitude of the in-combination effect of the Whole UWF Project, where considered in its entirety is Negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Suir SAC

Rationale for Impact Evaluation:

- The absence of Otter records at the grid Connection locations within the regional River Suir catchment (all outside the SAC);
- The absence of Otter records from UWF Related Works, UWF Replacement Forestry and UWF study areas;
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;

Qualifying Interests:

- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Activities

– Otter, Disturbance / Displacement

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Suir SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: Whole UWF Project magnitude is negligible and essentially in the order of effects from the UWF Related Works element. Pathways for effects to the Lower River Suir SAC are limited due to the absence of Otter records within these watercourses forming upper reaches of the River Suir outside the SAC.

In relation to other projects, agriculture, forestry and turf-cutting activities are not expected to be materially different from the existing baseline.

Overall cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Suir SAC**

Rationale for Impact Evaluation:

Whole UWF Project:

- The absence of Otter records at the Grid Connection locations within the regional River Suir catchment (all outside the SAC);
- The absence of Otter records from UWF Related Works, UWF Replacement Forestry and UWF study areas;
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;

Other Projects or Activities:

- The limited contrast to existing baseline conditions in the context of background agriculture, forestry and turf cutting

6.6.4 Summary of the Impact of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts Amendment) on Qualifying Interests of the Lower River Suir SAC

This section of the NIS has provided further evaluation of the source-impact pathways identified at Stage 1 Screening as having the potential to result in likely significant effects on the Lower River Suir SAC and its respective Qualifying Interests screened in for further appraisal.

This has included potential effects on QI habitats and QI species from decreases in instream aquatic habitat quality, changes to flow regime, riparian habitat degradation, and the spread of invasive species. Potential effects on QI Species examined have included direct mortality of fisheries and other aquatic species, disturbance to or displacement of fisheries and other aquatic species, along with mortality of and disturbance to or displacement of Otter. The Qualifying Interests screened in for evaluation at Stage 2 were:

Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial Forests (91E0)* (priority habitat) *Taxus baccata* woods of the British Isles [91J0]* (priority habitat)
Freshwater Pearl Mussel [1029] White-clawed Crayfish [1092] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Atlantic Salmon [1106]
Otter [1355]

The above Qualifying Interests both habitats and species have been subject to further examination in respect of their specific sensitivities & Conservation Objectives as to whether the identified pathways/effects can be considered likely to result in adverse effects on European Site Integrity via effects on Conservation Objectives; this has concluded that:

- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels via reductions in habitat area, occurrence and distribution, altered hydrological regime, altered structure and composition, increases in non-native species, changes to physical structure, increased grazing and /or disturbance.
- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechum* in the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.

- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.
- No effects on QI Habitat *Taxus baccata* woods of the British Isles via reductions in habitat area, occurrence and distribution, individual woodland size, altered structure and vegetative composition including increases in negative indicator species are expected.
- No effects on QI Species (Freshwater Pearl Mussel) via reductions in Population Size or distribution, Population Structure, extent or condition of supporting habitat (including water and substratum quality) quality, hydrological regime, host species or fringing habitat are expected.
- No effects on QI Species (White-clawed Crayfish) via reductions in distribution or population structure, increases in disease such as Crayfish Plague, increased negative indicator species (Alien Crayfish Species) & reductions in water or habitat quality are expected.
- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Cognisance has been given at this stage to the various Mitigation Measures (see Section 6.5.1) designed to specifically avoid adverse effects on European Site Integrity, and to in-combination effects with both other project elements of the Whole Upperchurch Windfarm Project in addition to other plans, projects or activities, or consented projects within the defined temporal and spatial overlap for cumulative or in combination effects. Effects both within and without (i.e. ex-situ) the Lower River Suir SAC have been considered.

Table 6-18, overleaf in Section 6.6.5 summarises the evaluation of the impact of the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities , on the Integrity of the Lower River Suir SAC.

6.6.5 Evaluation of the impact of the Whole UWF Project, including the Proposed Larger Turbines and Met Masts, on the Integrity of the Lower River Suir SAC

Using the checklist in the Table below, the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities , is examined for adverse impacts on the integrity of the Lower River Suir SAC.

Table 6-18: Integrity of Site checklist

Does the project or plan have the potential to:	**Yes/No**
- cause delays in progress towards achieving the conservation objectives of the site?	No
- interrupt progress towards achieving the conservation objectives of the site?	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No
- change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No
- reduce the area of key habitats?	No
- reduce the population of key species?	No
- change the balance between key species?	No
- reduce diversity of the site?	No
- result in disturbance that could affect population size or density or the balance between key species?	No

The evaluation herein has found, that following the examination and analysis presented, it can be concluded on a reasoned basis, that the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities , will not result in adverse effects on the Integrity of the Lower River Suir SAC, in circumstances where no reasonable scientific doubt remains.

6.7 Evaluation of Adverse Impacts to the Lower River Shannon SAC

The Screening stage evaluated the potential for the Proposed Larger Turbines and Met Masts and the Whole UWF Project to impact the Lower River Shannon SAC via identified impact pathways (Section 5.5.2). The potential for impacts was identified with regard to individual Qualifying Interests of the SAC. These impacts are evaluated further within this Section 6.7 of this Appropriate Assessment Report 2021, to determine whether the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities, will affect the favourable conservation status of these Qualifying Interest, and thus the overall integrity of the Lower River Shannon SAC.

The evaluation of the impacts of the Proposed Larger Turbines and Met Masts and the Whole UWF Project on the integrity of the Lower River Shannon SAC takes account of the following information:

- conservation objectives, outlined at Section 6.7.1 below, for the Qualifying Interests which were screened in for evaluation at Stage 2;
- the potential impact pathways to Qualifying Interests which were screened in for evaluation, these impact pathways are identified in Section 6.7.2;
- the description of the Proposed Larger Turbines and Met Masts and the Whole UWF Project as described in Section 2 of this report, and its Mitigation Measures as described in Section 6.5.1 of this report;
- the descriptions of the other unrelated projects and activiites as outlined in Section 2.8 of this report.

6.7.1 Conservation Objectives of Lower River Shannon SAC (002165)

The site-specific conservation objectives of the Lower River Shannon SAC aim to define favourable conservation condition for the particular habitat or species at that site. These objectives and conditions are summarised in Table 6-19 below in respect of the Qualifying Interests of the Lower River Shannon SAC which were screened in for further evaluation.

The conservation objectives of the Lower River Shannon SAC are available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites. The conservation objectives reproduced in the table below *(over)* were sourced from NPWS *Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. [Version dated 07/08/2012], and should be read in conjunction with any other supporting documentation on the referenced website as referenced above.

Table 6-19: Conservation Objectives of the Lower River Shannon SAC (002165)

Lower River Shannon SAC (002165)			
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260)		**To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**	
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	Three sub-types of high conservation value are known to occur in the site. See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details. Note: rooted macrophytes should be absent or trace (< 5% cover) in freshwater pearl mussel (*Margaritifera margaritifera*) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Cloon River within this SAC, because the mussel requires environmental conditions closer to natural background levels
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 13	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Hydrological regime: freshwater seepages	Metres per second	Maintain appropriate freshwater seepage regimes	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Substratum composition: particle size range	Millimetres	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (frequently sands, gravels and cobbles)	Although many of the high-conservation- value sub-types are dominated by coarse substrata, for certain sub-types, notably triangular club-rush (*Schoenoplectus triqueter*) and opposite-leaved pondweed (*Groenlandia densa*), fine substrata are required. See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Water quality: nutrients	Milligrams per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	The specific targets may vary among sub- types. See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Floodplain connectivity	Area	The area of active floodplain at and	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details

Lower River Shannon SAC (002165)			
		upstream of the habitat should be maintained	
Riparian habitat	Area	The area of riparian woodland at and upstream of the bryophyte-rich sub-type should be maintained	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details. See also the conservation objective for Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (91E0)
91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*		**To restore the favourable conservation condition of Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**	
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed. See map 14	Minimum area, based on 5 sites surveyed by Perrin et al. (2008) - site codes 1286, 1577, 1857, 1861, 1995. See woodland habitats supporting document for further details. NB further areas are likely to be present within the SAC
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 14	Distribution based on Perrin et al. (2008). NB further areas are likely to be present within the SAC.
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical and land-ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi- mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder and oak regenerate poorly. Ash often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river floodplains

Lower River Shannon SAC (002165)			
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-data and other rare or localised species. Perrin and Daly (2010) list four sites as containing potential ancient/long established woodland. See woodland habitats supporting document for further details
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder (Alnus glutinosa), willows (Salix spp) and, locally, oak (Quercus robur) and ash (Fraxinus excelsior)	Species reported in Perrin et al. (2008). See woodland habitats supporting document for further details
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: Himalayan balsam (*Impatiens glandulifera*), giant hogweed (*Heracleum mantegazzianum*), sycamore (*Acer pseudoplatanus*)
Atlantic Salmon (Salmo salar) (only in freshwater)	**To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. The large hydro-electric station at Ardnacrusha and the Parteen regulating weir present considerable obstructions to upstream passage of salmon on the Shannon main channel. While both have fish passes installed, upstream migration of salmon is still problematical. Further weirs upstream on the Shannon also restrict access to spawning habitat. No such obstacles, causing significant fish passage issues for salmon are present on the Feale and Mulkear rivers

Lower River Shannon SAC (002165)			
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2010). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The salmon stocks in the Shannon above the impoundments are significantly below their Conservation Limits. Salmon stocks in the Feale and Mulkear rivers are above CL
Salmon fry abundance	Number of fry/5 minutes electro-fishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL). The abundance of salmon fry at monitored sites on the Shannon main channel, above the hydro-electric station, is significantly below this target
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*). On the Shannon main channel, salmon smolt abundance may be significantly affected by mortality passing through hydro- electric turbines
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are currently preventing salmon from accessing suitable spawning habitat on the Shannon main channel
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Sea Lamprey (*Petromyzon marinus*)	**To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. See Gargan *et al.* (2011). Specific barriers serve to constrain the up- river migration of sea lamprey. The upper extent of the SAC in the R. Fergus is delineated by a barrier to migration. Barriers are also present in the Mulkear and Feale
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007)
Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003)
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Lampreys spawn in clean gravels. Surveys by Inland Fisheries Ireland (IFI) commonly indicated accumulations of redds downstream of major weirs. (See also Gargan *et al.*, 2011)

Lower River Shannon SAC (002165)			
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Despite observed spawning activity, sampling for ammocoetes consistently fails to find these in many sampling stations and never in any great numbers
Brook Lamprey (*Lampetra planeri*)	**To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution	% of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to brook lampreys' migration, both up- and downstream, thereby possibly limiting the species to specific stretches and creating genetically isolated populations (Espanhol *et al.*, 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Spawning site and redd attributes established by IFI (Rooney *et al.*, in press)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Many sites with suitable larval attributes i.e. fine sediment in low velocity habitat, are found not to contain larval lamprey. This may be a function of chance or probability or may be a consequence of insufficient recruitment to fill all spatial niches. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date (King *et al.*, unpublished data)
River Lamprey (*Lampetra fluviatilis*)	**To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution	% of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to river lampreys' migration, both up- and downstream, thereby possibly limiting species to specific stretches and creating genetically isolated populations (Espanhol *et al.*, 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003). It is impossible to distinguish between river and brook lamprey juveniles in the field (Gardiner 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx

Lower River Shannon SAC (002165)			
		river/brook lamprey at least 2/m²	(2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	*No Notes*
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Many sites with suitable larval attributes i.e. fine sediment in low velocity habitat, are found not to contain larval lamprey. This may be a function of chance or probability or may be a consequence of insufficient recruitment to fill all spatial niches. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date (King *et al.*, unpublished data)
Otter (*Lutra lutra*)	**To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in Shannon catchment estimated at 70.5% (Bailey and Rochford 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along river banks/ around ponds	No field surveys. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 4,461.6ha	No field surveys. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 500.1km	No field surveys. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 125.6ha	No field surveys. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston *et al.*, 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 17	Otters will regularly commute across stretches of open water up to 500m. e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

Lower River Shannon SAC (002165)

6.7.2 Qualifying Interests and potential impact pathways which were screened in for evaluation

The Qualifying Interests of the Lower River Shannon SAC and potential impact pathways which were screened in for evaluation are:

Table 6-20: Qualifying Interest Screened In due to potential for the Whole UWF Project to cause effects

Qualifying Interest of the Lower River Shannon SAC Screened In	Impact Pathways Screened in
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	SAC Pathway 1, 2, 3
Alluvial Forests (91E0) * (priority habitat)	SAC Pathway 2, 3
Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]	SAC Pathway 4, 5, 6, 7, 8

The SAC Impact Pathways 1 to 8 are described below:

SAC Pathway 1: Direct effects to **QI habitats** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within the SAC**

SAC Pathway 2: Indirect Effects to **QI habitats** of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **within the SAC**

SAC Pathway 3: Indirect Effects to **QI habitats**, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ***ex-situ*** the SAC

SAC Pathway 4: Direct effects to **QI species** of an SAC Site (i.e. mortality) **within or *ex-situ*** the SAC

SAC Pathway 5: Indirect effects to **QI species** of an SAC Site (i.e. disturbance /displacement) **within** the SAC

SAC Pathway 6: Indirect effects to **QI species** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within** the SAC

SAC Pathway 7: Indirect effects to **QI species** of the SAC Site (i.e. disturbance /displacement) ***ex-situ*** the SAC

SAC Pathway 8: Indirect effects to **QI species** of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ***ex-situ*** the SAC.

6.7.3 Evaluation of the Impact of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts)on Qualifying Interests of the Lower River Shannon SAC

In order to evaluate the effect of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project on the integrity of the Lower River Shannon SAC, the impact pathways identified above are examined in detail, through a number of focused impact evaluations, as per:

SAC Pathway 1 SAC Pathway 2 SAC Pathway 3 SAC Pathway 6 SAC Pathway 8	*Will be examined through these impact evaluations:*	• Decrease in instream aquatic habitat quality • Changes to flow regime • Riparian habitat degradation • Spread of invasive aquatic species
SAC Pathway 4		• Direct Mortality of Fish and Aquatic Species • Direct Mortality of Otter
SAC Pathway 5 SAC Pathway 7		• Disturbance or displacement of fish and aquatic species • Disturbance/Displacement of Otter.

For the purposes of the appraisal herein, effects on aquatic QI Habitats (and their respective conservation objectives) within the Lower River Shannon SAC (direct, secondary, within or *Ex-Situ*) as defined via possible pathways SAC Pathway 1, 2, 3, 6, and 8 can be characterised under a number of specific impact types. This includes general decreases in instream aquatic habitat quality, changes to flow regime, degradation of riparian habitat and potential indirect effects via the spread of aquatic invasive species.

Potential effects (direct, indirect within and *ex-situ*) on those QI species (and their respective conservation objectives) for which the Lower River Shannon SAC is designated, as defined via possible pathways SAC Pathway 4, 5 and 7 also fall under a number of typical impact categories, primarily related to the mortality of, or disturbance or displacement of aquatic species, both mammalian and fisheries.

Timing of Impacts

The main construction period will take 12 to 18 months to complete. The projected start date is 2022. Pre-construction activities will be carried out immediately prior to the commencement of the main construction period; these activities will include detailed design, confirmatory surveys, and vegetation clearance (during the appropriate period). The operational phase will commence upon completion of the construction phase. According to the conditions of planning permission for the Upperchurch Windfarm element '*the permission shall be for a period of 25 years from the date of the commissioning of the wind turbines. The wind turbines and related ancillary structures shall then be decommissioned and removed unless, prior to the end of the period, planning permission shall have been granted for their retention for a further period*'. The duration of UWF Related Works will mirror the operational lifetime of the windfarm. UWF Grid Connection will remain in permanent operation, and will not be decommissioned. UWF Replacement Forestry will be a permanent woodland and will not be harvested.

The potential for significant impacts to the Lower River Shannon SAC only relates to the construction stage of the Whole Upperchurch Windfarm Project. The construction stage was screened in for evaluation as the proposed construction stage works involve the installation of aquatic crossing structures and are taking place in locations with connectivity to the SAC. Potential impacts at this stage include instream aquatic habitat quality, changes to flow regime, riparian habitat degradation, spread of invasive aquatic species, direct mortality, and disturbance/displacement.

The potential for significant operational stage effects with regard to the Lower River Shannon SAC are screened out as maintenance works will be small scale, limited in duration and will take place from public road and hardcore areas. In addition the drainage system will remain in place at the Upperchurch Windfarm site and at Mountphilips Substation site during operation. Maintenance activities for the UWF Replacement Forestry will be of a negligible scale.

As decommissioning works will take place at the turbine hardstanding locations, and will be of limited scale and be short in duration, the potential for significant effects during decommissioning of Upperchurch Windfarm are screened out. UWF Related Works decommissioning is limited to Haul Route Works and the pulling of cables from the Internal Windfarm Cabling ducts. Any necessary Haul Route Activities to transport the turbine blades off-site will be carried out from the public road carriageway. Given the minor nature of these works the potential for decommissioning stage impacts are also screened out from further evaluation.

Evaluation of In-Combination Effects:

The evaluations of the impact of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project on the Qualifying Interests of the Lower River Shannon SAC takes into account the in-combination effect of the Whole UWF Project, and the in-combination effect of the Whole UWF Project with the following other unrelated projects and activities:

- Rearcross Quarry
- Castlewaller Windfarm
- Bunkimalta Windfarm
- Agriculture, Forestry and Turf-cutting in the surrounding area.

A description of the other projects is included in Section 2.8 of this report.

The location of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project in relation to the Lower River Shannon SAC is illustrated on the following mapping:

AA 2021 Figure 9: Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Lower River Shannon SAC

6.7.3.1 Evaluation of SAC Pathways 1, 2, 3, 6 & 8

6.7.3.1.1 Effects on QI habitats and/or QI species along Pathways 1, 2, 3, 6 & 8 from decreases in instream aquatic habitat quality, within or ex-situ the Lower River Shannon SAC

Impact Description:

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: instream works; culvert replacement works; parapet works; movement of soils and machinery; excavation works; Forestry felling; use of hydrocarbons & cement-based compounds; reinstatement works.

Other Unrelated Project/Activity Cumulative Impact Source: Instream works; Movement of soils and machinery; Excavation works; Forestry felling; Hydrocarbons; Reinstatement; Earthworks and Groundwork

Impact Pathway: Soils; Surface water, water flowpaths

Impact Description: Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community.

Instream works at some watercourses will require direct excavation of the banks and bed of the watercourse, which can change the physical character of the watercourse and has the potential to degrade the quality of the baseline habitat which supports the structure, function and diversity of aquatic species.

Water quality effects due to sedimentation: Erosion and deposition are natural process in watercourses[21], varying naturally throughout the year. However, additional sediment contributions entering the watercourse, such as from construction works in, adjacent to or upstream of individual watercourses, can have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels by sediment causing mortality impacts for salmonid eggs (affecting recruitment) and interfering with invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works.

In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, an altered hydrological regime and through secondary effects on prey item species, affect the supporting habitat quality for QI Species.

In instances where this impact occurs outside or ex-situ the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Decrease in instream aquatic habitat quality

Authorised Upperchurch Windfarm

Impact Magnitude: Construction works will take place in close proximity to 1 No. watercourses with fisheries value (Class 1, WW2) – however this is located entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. No effects are possible via decreases in aquatic habitat quality to the River Shannon SAC. The 2013 EIS concluded that water quality effects will not be significant.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Lower River Shannon SAC.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

[21] EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems,

Rationale for Impact Evaluation:

- Only a single watercourse crossing WW2, is associated with the wind farm, which is not connected to the Lower River Shannon SAC.
- A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required;
- All effects were evaluated as reversible and temporary in the short-term and impacts were associated with construction phase works.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to construction works or activities for the authorised Upperchurch Windfarm (including movement of soils and machinery, use of hydrocarbons & cement-based compounds; requirements for instream works or culvert works, excavation works, earthworks, groundworks, reinstatement works, and forestry felling at the windfarm site), and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Shannon SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Shannon SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.

Evaluations of the Other Elements of the Whole UWF Project – Decrease in instream aquatic habitat quality

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: Works at, or in close proximity to, watercourses have potential to cause decreases in instream habitat quality directly through instream works and indirectly through sediment laden/contaminated runoff into the watercourse.
There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works. 31 no. of the total 32 no. crossings are located within the Suir_SC_030 sub-catchment and 1 no. in the Bilboa_SC_010 sub-catchment. Of these 31 no. crossings the Suir_SC_030 sub-catchment, in-stream works will be required at 25 no. of these locations - 5 No. of which were evaluated as having fisheries value.

The Lower River Suir SAC is excluded from consideration in this table, hence only WW23, located in the Bilboa SC 010 sub-catchment is relevant in respect of the Lower River Shannon SAC. The 1 no. watercourse crossing remaining – WW23, which is located in the Bilboa_SC_010 (and hence the regional Lower River Shannon SAC catchment) will not require any instream works. This watercourse has no fisheries suitability and comprises a dry field drain. The authorised crossing method involves the installation of cabling over or under the structure.

The effect magnitude on the physical instream habitat within this tributary of the Bilboa i.e. watercourse channel morphology, substrate, and flow character due to instream works is evaluated as negligible in the context of a single watercourse crossing, with no associated instream works, 4.9km upstream hydrologically from the nearest boundary of the Lower River Shannon SAC.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Effects will be Imperceptible to Moderate in the local (ex-situ) context, with no adverse effect on the downstream European Site;
- Separation distance from the SAC under consideration;
- The receiving watercourse in the Bilboa catchment is a field drain with no fisheries potential;
- No instream works are required.

UWF Grid Connection (authorised)

Impact Magnitude:

Of the 68 No. watercourse crossings required for the UWF Grid Connection, 63 No. are located within the regional Shannon catchment. 15 No. of these watercourses have been evaluated as locations with fisheries value.

Of these 15 No. watercourses within the regional Shannon catchment, 3 no. watercourse crossings (W7 at Rockvale bridge, W45 and W53 at Anglesey Bridge) with fisheries value are within the boundary of the Lower River Shannon SAC**:** The remaining 12 crossings occur at varying distances upstream hydrologically from the Lower River Shannon SAC e.g. up to 13.9km hydrologically for Watercourse crossing W39.

Of the 15 No. watercourses within the regional Shannon catchment, 2 No. watercourses at Mountphilips (W1, W3) will be subject of instream works and 1 No. watercourse along the 110kV UGC with fisheries value (W14) will be subject to *potential* culvert replacement works. Each of these watercourses were classed as minor 1st order streams during watercourse surveys. Overall, the magnitude of the effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and water quality due to instream works at W1 and W3, and due to any culvert replacement works at W14 has been evaluated as having a Negligible magnitude with regard to availability, diversity and quality of habitat supporting aquatic species (including QI species of the Lower River Shannon SAC). This in line with the impact magnitude evaluation presented for instream works in UWF Grid Connection EIAR 2019 - Chapter 11 Water (Reference Document 20 of 36: 2019 UWF Grid Connection EIA Report – Volume C2: EIAR Main Report (2 of 2) – Chapter 11) - negligible magnitude/Imperceptible significance impact taking account of instream works). The potential for decreases in aquatic habitat quality due to additional sedimentation or contamination by fuels, oils or cement, is evaluated by sub-catchment below.

The remaining 12.No watercourses with fisheries value will not require instream works or culvert replacement works. This includes the crossing of the Newport River at W7 (within the SAC boundary, but works take place over the watercourse), the crossing of the Clare (Annagh) River at W36 and the crossing of the Bilboa River at W53 – the 110kV UGC will be installed within the existing bridge structures. The installation of the 110kV UGC at the other watercourses with fisheries value (W5, W8, W9, W18, W33, W38, W39, W45, W49 and W65) will not involve instream works as the cables will be installed either under or over the existing structures. Therefore, the potential for decreases in aquatic habitat quality at the remaining 12 No. watercourses only relates to sources of additional sedimentation or contamination by fuels, oils or cement. The potential for decreases in aquatic habitat quality due to water quality impacts i.e. via additional sedimentation or contamination by fuels, oils or cement, is evaluated as having a Negligible magnitude, in line with the Negligible Impact magnitude and Imperceptible impact significance presented for instream works, sedimentation and contamination effects in the UWF Grid Connection EIAR 2019 - Chapter 11 Water (Reference Document 20 of 36: 2019 UWF Grid Connection EIA Report – Volume C2: EIAR Main Report (2 of 2) – Chapter 11)

Significance of the Effect: No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for SAC Evaluation:

- Effects are considered to be Slight to Moderate at watercourses with fisheries value requiring instream works or culvert replacement works, with Slight Impacts at Sub-Catchment level-however in the context of the primarily downstream Lower River Shannon SAC this is considered unlikely to result in adverse effects on European Site integrity, considering the following;
- Application of comprehensive water quality protection measures for UWF Grid Connection through the EMP with supervision by supervised by a member of CIEEM and the Institute of Fisheries Management during all instream works and culvert replacement works (i.e. whether fisheries value or not);
- In-stream works at W1 & W3 and culvert replacement works at W14 will only be undertaken during the IFI specified period (July – September) (Project Design Measure), which puts works outside of key sensitivity periods for the aquatic receptors. Flow conditions during this period are also likely to be lower, with lower relative contributions from surface water run-off;
- The in-stream works will not be undertaken without isolation of flow within the watercourse, and the removal of fish within the isolated section, prior to the in-stream works commencing (Project Design Measure).;
- Implementation of the Project Design Measures for Water Quality protection (GC-PD17 to GC-PD50) through the Surface Water Management Plan for UWF Grid Connection
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design);
- The spatial extent of effects to the watercourse channel will occur within the footprint of any works at potential culvert replacement locations;
- The frequency of such an event is once for any culvert replacement works;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat.
- Impacts to the watercourse channel are temporary and reversible. The duration of any reductions in the quality of downstream habitats (including within the SAC) due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible; and
- It's likely only between 100 – 300m of the trench will be excavated in any day with only 1 – 3 watercourse crossings being completed in any one day (assumed 3 work crews). Therefore, taking account of the temporary nature of the works within the catchment, all effects will be brief to temporary in nature and reversible.

UWF Replacement Forestry (licensed) -

Impact Magnitude:

UWF Replacement Forestry is located at Foilnaman townland, near Upperchurch, County Tipperary, and is entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence effects due to the planting or growth stage works onsite are only applicable in the context of the evaluation of the Lower River Suir SAC. It is excluded from further consideration in respect of the Lower River Shannon SAC on the basis that it cannot contribute to likely significant or adverse effects on QI habitats or Species within the Lower River Shannon regional catchment or SAC. In relation to indirect impacts via transportation routes, which could be through the regional Shannon catchment, negligible magnitude of effects (if any) due to the location of all deliveries or transportation associated with this element being on public road networks, in the context of the extremely low volumes of traffic associated with this element.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Separation from the SAC under consideration;

UWF Other Activities

The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities.

There is no potential for aquatic habitat effects within or ex-situ to the Lower River Shannon SAC as there are no instream works or sediment creating activities adjacent to watercourses required as a result of UWF Other Activities (including Overhead Line Activities, Haul Route Activities). The Upperchurch Hen harrier Scheme is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence upstream or *ex-situ* to the Lower River Suir SAC (excluded from consideration in this table).

No potential for impacts to aquatic habitat quality arising from the spread of invasive species, as there are no instream works or activities adjacent to watercourses required as a result of UWF Other Activities. The Activities include

environmental protection measures.No potential for impacts to aquatic habitats due to tree felling, as no tree felling of conifer plantations is required.
Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- Separation from the SAC under consideration;

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Decrease in instream aquatic habitat quality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: The watercourse crossing works required for the UWF Grid Connection (68 No. total) are largely located within the River Shannon catchment (63 No.) while the watercourse crossings required for the Upperchurch Windfarm (1 No. natural stream) and UWF Related Works (32 No. watercourses in total) are largely located in the Suir_SC_030 sub-catchment.
For the Whole UWF Project within the River Shannon Catchment and hence potentially where the pathways under consideration exist to the Lower River Shannon SAC, a potential decrease in aquatic habitat quality due to instream/culvert replacement works is identified at a total of 3 No. watercourses (W1, W3, W14) evaluated as having fisheries value – all in respect of UWF Grid Connection.
The spatial extent of habitat quality effects arising from Whole UWF Project impacts, due to instream works or water quality contamination, will potentially occur within the footprint of the instream/culvert replacement works, taking account of Project Design measures and implementation of mitigation measures stipulated for individual Project Elements. These effects will be dispersed between two regional catchments and within several local sub-catchments. Impact range is located downstream of the lowest point in the waterbody where Whole UWF Project works are required, with reference to the zone of sediment transport. It is evaluated that the cumulative impact magnitude will be Low to Medium in the context of one of the above referenced regional catchments, namely the River Shannon regional catchment, wherein the Lower River Shannon SAC is located.
Magnitude is in the order of UWF Grid Connection and is evaluated as negligible overall.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- Effects are considered to be Imperceptible to Moderate in the local context with no adverse effects on downstream (Lower River Shannon SAC) European Site integrity
- The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species downstream.
- The low number of watercourses (3 No. in total) with fisheries value and subject to instream/culvert replacement works, in the context of the Lower River Shannon SAC.
- the location of works within a large regional catchment with significant assimilation capacity;
- the linear nature of the UWF Grid Connection 110kV UGC works over a large c.23km latitudinal distance;
- The spatial extent of effects to watercourse channels will occur within the footprint of the instream works,
- The once off frequency and brief to temporary duration of works within or adjacent to the aquatic habitat.
- Impacts at the works site are temporary and reversible; however, any reduction in habitat quality due to potential downstream siltation effects are considered to be short-term to temporary and not reversible – although the resultant magnitude of any irreversible siltation effect on the SAC is not considered to be sufficient to result in adverse effects on site integrity.

Qualifying Interests:
- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and

composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.

- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Decrease in instream aquatic habitat quality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:

In relation to cumulative effects within the Killeengarriff_SC_010 sub-catchment; Approximately 13.7km of the 110kV UGC and the Mountphilips Substation site and part of a potential Bunkimalta Windfarm footprint and 0.2km of the consented grid connection, and 9.6km of the potential grid connection route for Castlewaller Windfarm are located within the Killeengarriff_SC_010. There are no other elements of the Whole UWF Project requiring instream works, or contributing to aquatic habitat deterioration (water quality contamination or deterioration) within this sub-catchment.

In relation to cumulative effects within the Newport (Tipperary)_SC_010 sub-catchment; Approximately 3.5km of the 110kV UGC, along with part of a potential Bunkimalta Windfarm footprint and 6.4km of the potential consented Bunkimalta Windfarm grid connections, and all of the Castlewaller Windfarm and 4.8km of the potential Castlewaller Windfarm grid connection are located within the Newport (Tipperary)_SC_010 sub-catchment. There are no other elements of the Whole UWF Project requiring instream works, or contributing to aquatic habitat deterioration (water quality contamination or deterioration) within this sub-catchment.

The remaining elements of the Whole UWF Project are located in the Bilboa River sub-catchment and in the Suir_SC_030 sub-catchment (excluded in this table) and are therefore spatially distant and hydrologically separated from any cumulative interactions due to instream works with Other Projects and Activities.

The magnitude of cumulative impact is negligible to low, taking account of the impact evaluations for the Whole UWF Project and those of the Other Projects and Activities identified in the wider study area, with cognisance of the aquatic sensitivities in the affected catchments.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Shannon SAC**

Rationale for Cumulative Impact Evaluation:

- Effects are considered to be slight to Moderate overall, however no adverse effect on the downstream SAC is expected.
- The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species downstream.
- The low number of watercourses (3 No. in total) with fisheries value and subject to instream/culvert replacement works.
- the location of works in two separate regional catchments;
- the linear nature of the UWF Grid Connection 110kV UGC works over a large c.23km latitudinal distance;
- The spatial extent of effects to watercourse channels will occur within the footprint of the instream works,
- The once off frequency and brief to temporary duration of works within or adjacent to the aquatic habitat.
- Impacts at the works site are temporary and reversible; however, any reduction in habitat quality due to potential downstream siltation effects are considered to be short-term to temporary and not reversible.
- The location of the grid connections for Bunkimalta Windfarm (consented) and Castlewaller Windfarm (potential) predominately on existing forestry/public roads within the catchment;
- The large surface water catchment area of the Killeengarriff_SC_10 sub-catchment (122km^2) and Newport (Tipperary)_SC_010 sub-catchment(95km^2);
- The relatively large upstream distance of the potential Bunkimalta Windfarm site (~10km) from the 110kV works;

- Sediment Control Plans expected to be implemented for the potential Bunkimalta Windfarm and associated consented grid connection, consented Castlewaller Windfarm (and potential grid connection) as per best practice and to ensure no adverse effects to downstream SACs.
- the location of the grid connections for Bunkimalta Windfarm (consented) and Castlewaller Windfarm (potential) predominately on existing forestry/public roads within the catchment.

6.7.3.1.2 Effects on QI habitats and/or QI species along Pathways 1, 2, 3, 6 & 8 from changes to flow regime within or ex-situ the Lower River Shannon SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: instream works; culvert replacement works; movement of soils and machinery; excavation works; new crossing structures

Other Unrelated Project/Activity Cumulative Impact Source: Instream works; new crossing structures; movement of soils and machinery;

Impact Pathway: Surface water;

Impact Description: Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. There is potential for direct impacts to channel morphology and geomorphology (bed and banks of watercourses) due to instream works. The potential for indirect effects which would lead to sediment deposition at a scale to alter channel morphology or the flow regime are considered unlikely; with reference to Project Design measures. However, direct effects may impact European Sites, where watercourse crossings overlap SAC boundaries or occur immediately adjacent. In this table consideration is given to impact pathways via changes to flow regime on the Lower River Shannon SAC.

Aquatic species are likely to be present in fishery value watercourses at instream construction works locations. Any change in watercourse morphology which affects channel flow regimes can result in cross factor effects on aquatic ecological communities, within or *ex-situ* an SAC. Aquatic species are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration and the avoidance of barriers to passage; and avoidance of channel constriction during low flow.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, an altered hydrological regime and through secondary effects on prey item species, affect the supporting habitat quality for QI Species.

In instances where this impact occurs outside or ex-situ the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.The creation of adverse flow conditions or habitat limitations due to changes to flow or morphology will be limited to the specific works period within or adjacent to the aquatic habitat.

Project Design Measures also include the use of culverts at all new permanent watercourse crossings which will be a minimum of 900mm in diameter and will be bottomless or clear spanning at W1, W2, W3 and W14 watercourse crossings. In addition, in-stream works will only be undertaken during dry weather within the IFI instream works window (July – September inclusive), and will include for the equilibrated reinstatement of flow and the use of diffuser plates where required.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Changes to Flow Regime

Authorised Upperchurch Windfarm

Impact Magnitude: Construction works will take place in close proximity to 1 No. watercourses with fisheries value (Class 1, WW2) – however this is located entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. No effects are possible via changes in flow regime to the River Shannon SAC.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Lower River Shannon SAC.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- WW2 is located entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:
- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to the footprint of or construction works or activities for the authorised Upperchurch Windfarm (including movement of soils and machinery, excavation works), and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Shannon SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Shannon SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:
- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.

Evaluations of the Other Elements of the Whole UWF Project - Changes to Flow Regime

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
Works at, or in close proximity to, watercourses have potential to cause changes to flow regime through instream works and indirectly through sediment laden runoff into the watercourse. The 1 no. watercourse crossing in the Bilboa_SC_010 will not require any instream works. The magnitude of impact is negligible.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- Only a single watercourse crossing occurs within any sub-catchment of the Regional Shannon Catchment, with;
- No instream works required.

UWF Grid Connection (authorised)

Impact Magnitude:
Works at, or in close proximity to, watercourses have potential to indirectly affect aquatic species and habitats through changes to flow regimes which can be caused directly by morphological changes due to instream works.
15 No. of the 63 No. watercourses within the UWF Grid Connection site (within the regional River Shannon catchment) are evaluated as having fisheries value (i.e. Class 1 or Class 2). Of these 15, 3 no. watercourse crossings (W7-located at Rockvale bridge, W45 and W53) with fisheries value are within the boundary of the Lower River Shannon SAC**:** The remaining 12 crossings occur at varying distances upstream hydrologically from the Lower River Shannon SAC -e.g. W39 is 13.9km hydrologically upstream of the Lower River Shannon SAC.
At Mountphilips Substation 3 no. watercourse crossings are authorised, two of these watercourses (W1 and W3 – both outside the SAC but within the regional River Shannon catchment) have fisheries value (both Class 2). Instream works at these two watercourses will involve the installation of one temporary crossing structure (W1) and one permanent crossing structure (W3). Changes to the flow regime will be temporary at W1 and permanent at W3.
The 60 No. watercourse crossings along the UWF Grid Connection 110kV UGC, outside of the Mountphilips Substation site, but within the regional Shannon Catchment, all exist along the public road network and along the private paved road near the Consented UWF Substation. Outside of Mountphilips, 12 No. watercourses within the regional Shannon catchment have been evaluated to have fisheries value. Of these 12 No. watercourses, 1 No. will be subject to *potential* culvert replacement works (W14- outside the SAC as already noted). At W14, changes to the flow regime will be brief (1 day) and for the duration of the immediate works, restricted to the location of the works area within the footprint of, or directly adjacent to the existing crossing point in the public road. Changes to the flow regime at these crossing locations will be avoided through the isolation of flow, over pumping of the water from upstream to downstream of works, the use of deflector plates, the equilibrated restoration of flow and the sensitive restoration of the bed and banks of these watercourse following works (Project Design). The magnitude of impact is negligible to low, and the duration is long-term and permanent, taking account of Project Design.
The remaining 11 No. watercourses with fisheries value, including all required crossings of major rivers Newport, Clare and Bilboa Rivers, are all across existing crossing structures which do not require any instream works or culvert replacement works and cables will be installed either under or over the structure. Any changes to flow regime due to sedimentation will be of negligible magnitude with the implementation of Project Design Measures, such as the use of sandbags to avoid the runoff of sediment laden water from construction works areas, and the treatment of any water pumped from excavations prior to discharge. The magnitude of impact is negligible.

Significance of the Impact: : No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Effects are considered to be Slight in the local context with no adverse effect on the downstream Lower River Shannon SAC
- In-stream works at W1 and W3, and culvert replacement works at W14 will only be undertaken during dry weather within the IFI specified period (July – September) for the watercourses with fisheries value, this with fisheries value, this will also be applied to W2 and the 11 no. watercourses with sub-optimal or no fisheries value (Project Design Measure);
- The Class 1 and Class 2 watercourses at W1, W3 and W14 are characterized as small, first order streams, which have all been in some way altered by the existing landuse (i.e. agriculture or public road infrastructure);
- The limited extent of direct instream works potentially affecting flow, and the sensitive design of new/replaced crossing structures following from pre-planning consultation with IFI.
- The brief to temporary duration and reversibility of any effects.
- the implementation of comprehensive water quality protection measures as part of the Mitigation Measures which will minimize/avoid sediment laden runoff from entering watercourses.

UWF Replacement Forestry (licensed)

UWF Replacement Forestry is located at Foilnaman townland, near Upperchurch, County Tipperary, and is entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence effects are only applicable in the context of the evaluation of the Lower River Suir SAC. It is excluded from further consideration in respect of the Lower River Shannon SAC on the basis that it cannot contribute to adverse effects on QI habitats or Species within the Lower River Shannon SAC.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Separation from the SAC under consideration;

UWF Other Activities

Lower River Shannon SAC

Stage 2: Natura Impact Statement

Impact Magnitude: Any sedimentation caused by UWF Other Activities will be negligible and consequently this Whole UWF Project element is not likely to contribute to any changes to flow regimes.
Impact magnitude is negligible.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- Separation from the SAC under consideration;

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Changes to Flow Regime

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: A potential decrease in aquatic habitat via changes to flow regime is identified at 3 No. UWF Grid Connection watercourse crossings (W1, W3 and W14) where new instream works or culvert replacement works are required within watercourses evaluated as having fisheries value. All are located outside the SAC but within the regional River Shannon catchment and are therefore outside the SAC but hydrologically connected at varying distances (W1:3.3km, W3:3.75km and W14:6km).

The potential for indirect effects which would lead to sediment deposition at a scale to alter channel morphology or the flow regime of a downstream SAC are considered unlikely. The spatial extent of such effects will occur primarily within the footprint of the instream works, extending to immediately downstream where hydrological flow character may be altered due to bank or river bed modification, recognising that cumulative effects are widely dispersed between two regional catchments and within several sub-catchments.

Immediately downstream effects are not considered to extend to a distance large enough to result in noticeable negative effects on downstream SAC's. Dispersal of cumulative effects across a significant catchment size also negates the likelihood of adverse in combination effects on the SAC under consideration. Magnitude is evaluated as negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Cumulative Impact Evaluation:
- Instream works potentially affecting the flow regime are required at a limited number of locations; which require temporary works and permanent instream structures.
- Implementation of Project Design Measures at all stream/culvert crossings, instream works and culvert replacement works locations to minimize effects
- Implementation of the sensitive crossing designs developed following consultation with IFI.
- Provision of reinstatement works at new permanent crossings/replaced existing culverts including: site-specific bank stabilization measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles.
- Separation distance from European Sites and dispersal factor.

Qualifying Interests:
- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities – Changes to Flow Regime

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower

River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:
Overall magnitude is evaluated as negligible in respect of the Whole UWF Project, and the consented Castlewaller Windfarm and potential Bunkimalta Windfarm and their respective grid connections, and the additionally considered Rearcross Quarry, and background activities such as Turfcutting, Forestry and Agriculture, given the limited number of locations where a potential change to Aquatic Flow Regime may occur, in addition to the localised nature of impacts and the wide dispersal area under consideration.
Overall cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Shannon SAC**

Rationale for Cumulative Impact Evaluation:

- Instream works connected to the UWF Grid Connection potentially affecting the flow regime are required at a limited number of locations; which require temporary works and permanent instream structures.
- Implementation of UWF Grid Connection Mitigaiton Measures at all stream/culvert crossings, instream works and culvert replacement works locations to minimize effects
- Implementation of the sensitive crossing designs as part of UWF Grid Connection developed following pre-planning consultation with IFI.
- the use of deflector plates, the equilibrated restoration of flow
- Provision of reinstatement works as part of UWF Grid Connection at new permanent crossings/replaced existing culverts culverts under supervision of a member of CIEEM and the Institute of Fisheries Management.
- Other Projects
- The absence of instream works and separation from watercourses for Rearcross Quarry
- The implementation of Best Practice water quality measures during construction works for Castlewaller Windfarm and the potential Bunkimalta Windfarm (assumed).
- No material changes to existing baselines in respect of Agriculture, Forestry and Turf-cutting are expected or planned in the area.

6.7.3.1.3 Effects on QI habitats and/or QI species along Pathways 1, 2, 3, 6 & 8 from Riparian habitat degradation within or ex-situ the Lower River Shannon SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: instream works, culvert replacement works; Forestry felling movement of soils and machinery; excavation works; reinstatement works
Other Unrelated Project/Activity Cumulative Impact Source: Instream works; Movement of soils and machinery; Excavation works; Forestry felling; Reinstatement
Impact Pathway: Soils; Direct contact
Impact Description: The riparian corridor along a watercourse relates to the interface between the aquatic habitat, the bankside vegetation and terrestrial environment. An intact, semi-natural riparian zone has significant beneficial services in the protection of instream aquatic habitat quality, food/nutrient contributions, and temperature regulation. Existing riparian habitat quality within the study area is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.
The removal of, or damage to, riparian vegetation during instream works or excavation/ground clearance works in close proximity to any watercourse has the potential to impact on the quality of riparian habitats which in turn can affect watercourse morphology, shading, bank stability, and nutrient and sediment loading and result in indirect effects on aquatic species. The magnitude of resultant effects is expected to be higher when this occurs within an SAC as to without, given that effects are naturally localised. However downstream effects may occur to European Sites where

suitable connectivity exists especially if riparian habitat degradation ex-situ leads to increased downstream sediment loads, or sufficiently affects upstream spawning habitats etc. which in effect support SAC qualifying interests.
Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, an altered hydrological regime and through secondary effects on prey item species, affect the supporting habitat quality for QI Species.
In instances where this impact occurs outside or ex-situ the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/ QI species, thus affecting Site Integrity/Conservation Objectives similarly.
Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Riparian Habitat Degradation

Authorised Upperchurch Windfarm

Impact Magnitude:
As per the 2013 EIS, 1 No. watercourse with fisheries value will be crossed. The crossing method will utilise a clear span bridge design, which will avoid the requirement for instream works; however, works within the riparian zone will be required. However, this is located entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment and is therefore cannot act in combination in respect of the River Shannon SAC. It is excluded from further consideration.
An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Lower River Shannon SAC.

Significance of the Impact: No adverse effects on the River Shannon SAC

Rationale for Impact Evaluation:
- No requirement for instream works on fisheries value watercourses
- Limited scale of works within the riparian corridor at the 1 no. stream crossing (not located in River Shannon catchment);
- All effects were evaluated as reversible and temporary in the short-term;
- Riparian habitats within the Upperchurch Windfarm which are directly affected by construction works were not identified as being of significant conservation value.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:
- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to construction works or activities for the authorised Upperchurch Windfarm (including movement of soils and machinery, excavation works, reinstatement works and forestry felling), and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Shannon SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Shannon SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:
- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and

composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.

- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected..

Evaluations of the Other Elements of the Whole UWF Project - Riparian habitat degradation

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: Riparian habitat will be affected at 6 No. watercourse crossings identified as having fisheries value, out of a total of 32 watercourse crossings within the construction works area boundary associated with the UWF Related Works. However, all are located within the Clodiagh (Tipperary) sub-catchment of the regional Suir Catchment, and therefore are applicable only to the consideration of potentially adverse effects on the Lower River Suir SAC. The 1 no. watercourse crossing in the Bilboa_SC_010 will not require any instream works.
The duration of any loss of well-structured riparian habitat impacts will not result in any possibility of adverse effects on the River Shannon SAC. Impact Magnitude is negligible.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No hydrological connectivity to the Lower River Shannon SAC for locations of instream works.

UWF Grid Connection (authorised)

Impact Magnitude: Of the 63 No. watercourse crossings required for the UWF Grid Connection in the River Shanonn catchment, 15 No. have been evaluated to have fisheries value. Of these 15, 3 no. watercourse crossings (W7 at Rockvale bridge, W45 and W53 at Anglesey Bridge) with fisheries value are within the boundary of the Lower River Shannon SAC. The remaining 12 crossings occur at varying distances upstream hydrologically from the Lower River Shannon SAC -e.g. W39 is 13.9km hydrologically upstream of the Lower River Shannon SAC.
Of the 15 No. applicable watercourses, 2 No. watercourses at Mountphilips (W1, W3) will be subject of instream works. Watercourse crossings W1 and W3 are upstream of the Lower River Shannon SAC at hydrological distances of 3.3km and 3.75km respectively.
Riparian habitat at the W1 and W3 crossing locations consists of vegetation clearance (as necessary: topsoil stripping, scrub removal) within the boundary of the temporary construction works area at the Mountphilips Substation site. As per Project Design, following works at W1 and W3, reinstatement works will be carried out which will include site-specific bank stabilisation measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels within the bank-width of the existing river corridor, where necessary and replanting of riparian buffer zones with suitable native species to manage flood flows and buffer run-off. The duration of any loss of well-structured riparian habitat impacts is evaluated with regard to the direct aquatic habitat services provided by the riparian zone (bank stabilization and erosion control, shading and temperature regulation), as well as the indirect inputs such as habitat for invertebrate food for fish and aquatic biota, reduction in light for aquatic flora, flood control and buffering effects in relation to run-off. The context of riparian habitat quality in the study area is considered, with regard to existing intensive agriculture affecting baseline conditions at the W1 and W3 crossing points; which has resulted in degraded cover due to bank side clearance works at the majority of crossing locations. Riparian habitat impacts will be reversible with reinstatement and will be temporary to short-term, ex-situ to the SAC, limited to

the construction phase and early operational stage until vegetation has re-established. The impact magnitude is negligible in the context of the downstream SAC under consideration.

Culvert replacement works will be required at **1 no**. watercourse W14 (which has fisheries value) along the 110kV UGC, and 6km upstream hydrologically of the River Shannon SAC. The replacement of the existing culvert is expected to have minimal effect on any adjacent riparian habitat degradation due to the works taking place from the road pavement above, and from either side of, the culvert, with works in the watercourse limited to the placement of sandbags and deflector plates, placement of the culvert and reinstatement works. Any reinstatement of the immediately adjacent culvert finishing works, will be of a negligible magnitude and will not result in any impact on adjacent (ex-situ to the SAC) riparian habitat.

At the remaining 12 No. watercourse crossings along the 110kV UGC route (which have fisheries value and are connected to the River Shannon SAC), including all required crossings of major rivers (Newport, Clare and Bilboa), the installation of the 110kV UGC will utilise existing crossing structures which do not require any instream works or culvert replacement works and the 110kV UGC will be installed within the existing bridge structures; or under or over the existing culverts, therefore there is no potential to damage or remove riparian habitat either side of the road corridor at these locations.

At the remaining 48 watercourse crossings locations (W2 at the Mountphilips Substation site, and 47 No. along the 110kV UGC route), works required are at existing watercourse crossing locations which have low/none fisheries value, works similarly will only involve trenching under or over the existing structure with no works in the verges, the impact magnitude of riparian habitat degradation on aquatic ecological receptors is evaluated as negligible.

Significance of the Impact : No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Effects are considered to be Slight to Moderate in the local context with no adverse effect on the River Shannon SAC;
- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to 3 watercourse crossing locations within minor watercourses (W1, W3 and W14), all outside the SAC boundary;
- The general context of the three watercourses affected comprises first order streams within managed agricultural lands within enclosed or fully tunneled riparian vegetation at the crossing points;
- Bank works will be required at watercourse crossing locations W1, W3, with minor clearance of riparian vegetation within the footprint of the potential culvert replacement at W14;
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions and reversible with reinstatement;
- supervision of all instream works (i.e. W1, W2 (no fisheries value) and W3) and culvert replacement works (W14 and 11 no. other locations at watercourses with sub-optimal or no fisheries value) by a member of CIEEM and the Institute of Fisheries Management.

UWF Replacement Forestry (licensed)

UWF Replacement Forestry is located at Foilnaman townland, near Upperchurch, County Tipperary, and is entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence effects are only applicable in the context of the evaluation of the Lower River Suir SAC. It is excluded from further consideration in respect of the Lower River Shannon SAC on the basis that it cannot contribute to likely significant or adverse effects on QI habitats or Species within the Lower River Shannon SAC.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No hydrological connectivity to the Lower River Shannon SAC.

UWF Other Activities

The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities.

In relation to effects via riparian habitat degradation, elements of Other Activities which have any potential to interact with riparian habitats are essentially linked to the UHHS, which is located in its entirety in the Clodiagh (Tipperary) sub-catchment of the River Suir Regional Catchment.

Effects from remaining activities (i.e. Overhead Line Activities, Haul Route Activities) located in the River Shannon catchment, and hence where connectivity to the Lower River Shannon SAC may exist, are evaluated as negligible in magnitude in the context of riparian habitat degradation as no instream works or works in immediate proximity to watercourses are required.

Significance of the Impact: No adverse effects on the integrity of the River Shannon SAC

Rationale for Impact Evaluation:
- No instream works, and no watercourse crossing works required, Scale of works in proximity to watercourses (UHHS).

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Riparian habitat degradation

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude:
Riparian habitat will be affected at 3 No. watercourses with fisheries value which will be only be associated with works for the UWF Grid Connection in the Shannon regional catchment. The cumulative impact magnitude of the Whole UWF Project on the riparian and bankside habitats within the Shannon regional catchment and hence the Lower River Shannon SAC is evaluated as Negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):
No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Cumulative Impact Evaluation:
- The instream works at W1 and W3, and culvert replacement works at W14 required for the 110kV UGC are all located within the Lower River Shannon SAC catchment, while the watercourse crossings required for the Upperchurch Windfarm and UWF Related Works are all located in the River Suir surface water catchment;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at stream crossing locations, limited to the direct footprint of the temporary works areas; alternatives to temporary riparian clearance are not available – however these all occur ex-situ i.e. outside the SAC (i.e. at W1, W3 and W14).
- The duration of the impact are generally once-off, restricted to the period of works within or adjacent to the aquatic habitat; relate to individual watercourses removed from the SAC and are thus not subject to sequential project effects.
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible.

Qualifying Interests:
- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities – Riparian habitat degradation

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: Whole UWF Project magnitude is limited to where riparian habitat will be affected at 3 No. watercourses with fisheries value which will be associated with UWF Grid Connection 110kV UGC works. The impact magnitude of the Whole UWF Project on the riparian and bankside

habitats within the Shannon regional catchment and hence the Lower River Shannon SAC is evaluated as Negligible. The magnitude of effect from the considered wind farms (Bunkimalta and Castlewaller) along with their associated Grid Connection elements, Quarries within the cumulative ZOI and background activities including forestry, agriculture and turbary is evaluated as negligible.Overall impact magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Shannon SAC**

Rationale for Cumulative Impact Evaluation:

Whole UWF Project:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations, upstream from the SAC, with no overlap between UWF Grid Connection and the Other Elements, as instream works will take place in separate catchments.
- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to 3 watercourse crossing locations within minor watercourses (W1, W3 and W14), all outside the SAC boundary;
- The general context of the three watercourses affected comprises first order streams within managed agricultural lands within enclosed or fully tunneled riparian vegetation at the crossing points;
- Bank works will be required at watercourse crossing locations W1, W3, with minor clearance of riparian vegetation within the footprint of the potential culvert replacement at W14;
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions and reversible with reinstatement;
- supervision of all instream works (i.e. W1, W2 (no fisheries value) and W3) and culvert replacement works (W14 and 11 no. other locations at watercourses with sub-optimal or no fisheries value) by a member of CIEEM and the Institute of Fisheries Management.

Other Projects:

- Physical and spatial isolation, i.e. separation distance of Rearcross Quarry, Castlewaller Windfarm, and Bunkimalta Windfarm from the 110kV UGC works at W1, W3 and W14.
- No change from existing baseline conditions in respect of Agriculture, Forestry and Turf Cutting.

6.7.3.1.4 Effects on QI habitats and/or QI species along Pathways 1, 2, 3, 6 & 8 from the Spread of Invasive Aquatic Species within or ex-situ the Lower River Shannon SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: instream works; culvert replacement works; excavation works, movement of soils and machinery;

Other Unrelated Project/Activity Cumulative Impact Source: Instream works; Excavation works, movement of soils and machinery

Impact Pathway: Surface water; Movement of soils and machinery

Impact Description: Invasive aquatic species include non-native, terrestrial invasive species such as Japanese knotweed or Himalayan balsam, invasive riparian vegetation (such as Japanese knotweed) and also fish and mobile invertebrate fauna (such as Asian clam, Signal crayfish, or non-native shrimp species). Aquatic invasive species may be introduced to unaffected catchments or spread within infected watercourses during the course of instream works or transported via excavated material by site machinery.

Aquatic invasive species have the potential for significant ecosystem disturbance, disrupting the predator/prey balance or causing habitat disruption within aquatic systems. The spread of aquatic invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream (mobile species and 3rd party transport) and downstream (hydrological transport) within a watercourse, potentially extending throughout the catchment.

Non-native, invasive species potentially affecting the aquatic environment can also include terrestrial species which compromise bank integrity, riparian structural diversity and riparian invertebrate production contributing to habitat diversity and feeding inputs within the aquatic system.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, an altered hydrological regime and through secondary effects on prey item species, affect the supporting habitat quality for QI Species.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

The management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plans which includes Best Practice biosecurity measures and supervision by an invasive species specialist, this will ensure that the spread of invasive species is avoided.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Spread of Aquatic Invasive Species

Authorised Upperchurch Windfarm

Impact Magnitude:

The majority of Upperchurch Windfarm works will occur in the River Suir catchment. There is the potential for introduction of non-native, invasive aquatic species at the 1 No. watercourse crossing associated with the Upperchurch Windfarm works. As per the 2013 EIS, 1 No. watercourse with fisheries value will be crossed. The crossing method will utilise a clear span bridge design, which will avoid the requirement for instream works; however, works within the riparian zone will be required. However, this is located entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment and is therefore cannot act in combination in respect of the River Shannon SAC. It is excluded from further consideration.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Lower River Shannon SAC.

The management of non-native, invasive species at Upperchurch Windfarm locations will be subject to Best Practice biosecurity measures and invasive species control, along with supervision by an invasive species specialist, as provided in the Environmental Management Plan (2021), this will ensure that the spread of invasive species is avoided, and therefore it is considered that this impact is unlikely to occur.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- The Upperchurch Windfarm single watercourse crossing is not located within the Lower River Shannon SAC Catchment.
- In this respect, the spread of aquatic invasive species is evaluated as non-reversible, however
- the implementation of the Invasive Species Management Plan, including best practice biosecurity protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring,
- Thus avoiding the likelihood of adverse effects on the integrity of the River Shannon SAC.
-

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to construction works or activities for the authorised Upperchurch Windfarm (including use of machinery, earthworks, groundworks or reinstatement works) or to volumes or transport delivery routes for construction materials associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Shannon SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Shannon SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected.

Evaluations of the Other Elements of the Whole UWF Project - Spread of Aquatic Invasive Species

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
There is the potential for introduction of non-native, invasive aquatic species at all 32 No. watercourse crossings associated with the UWF Related Works. Of the 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works. 31 no. of the total 32 no. crossings are located within the Suir_SC_030 sub-catchment and 1 no. in the Bilboa_SC_010 sub-catchment. Hence only one is applicable for consideration here.
However the management of non-native, invasive species at UWF Related Works locations will be subject to Best Practice biosecurity measures and invasive species control, along with supervision by an invasive species specialist, as provided in the UWF Related Works Invasive Species Management Plan, this will ensure that the spread of invasive species is avoided, and therefore it is considered that this impact is unlikely to occur
Magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species is evaluated as non-reversible, however
- the implementation of the Invasive Species Management Plan, including best practice biosecurity protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring,

● Thus avoiding the likelihood of adverse effects on the integrity of the River Shannon SAC.
UWF Grid Connection (authorised)
Impact Magnitude: There is the potential for introduction of non-native, invasive species to the Lower River Shannon SAC occurs at all 63 No. watercourse crossing points associated with the Mountphilips Substation site and 110kV UGC works due to the carrying out of works at or in close proximity to watercourses, and due to the movement of machinery over watercourses at existing road crossings; these include the transport, spread or introduction of terrestrial invasive species such as Japanese knotweed or Himalayan balsam, where these species occur widely within the study area. The potential for introduction of aquatic invasive species including mobile invertebrate fauna (such as Asian clam, Signal crayfish, or non-native shrimp species) or invasive riparian vegetation (such as Japanese knotweed), is limited to the instream works areas at W1, W2 and W3 at the Mountphilips Substation site, and at the 12 No. culvert replacement locations along the route of the 110kV UGC, where works may interact with the aquatic environment to facilitate introduction or spread of aquatic species. The management of invasive species will be subject to a bespoke Invasive Species Management Plan which includes Best Practice biosecurity measures and supervision by an invasive species specialist, this will ensure that the spread of invasive species is avoided.
Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC
Rationale for Impact Evaluation: ● The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication. ● In this respect, spread of aquatic invasive species is evaluated as non-reversible; however ● All instream works are outside the SAC, and significantly upstream in some instances, with; ● the implementation of the Invasive Species Management Plan and adherence to best practice Biosecurity Protocols (IFI, 2010) ensuring that there is no likelihood of this effect occurring to the River Shannon SAC.
UWF Replacement Forestry (licensed)
UWF Replacement Forestry is located at Foilnaman townland, near Upperchurch, County Tipperary, and is entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment, hence effects are only applicable in the context of the evaluation of the Lower River Suir SAC. It is excluded from further consideration in respect of the Lower River Shannon SAC on the basis that it cannot contribute to likely significant or adverse effects on QI habitats or Species within the Lower River Shannon SAC.
Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC
Rationale for Impact Evaluation: ● No watercourse crossing works required for UWF Replacement Forestry ● Not located within the River Shannon catchment.
UWF Other Activities
The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. In relation to effects via the spread of invasive species, elements of Other Activities which have any potential to interact with aquatic habitats are essentially linked to activities such as Overhead Line Activities, Haul Route Activities located in the River Shannon catchment, and hence where connectivity to the Lower River Shannon SAC may exist. However, as no watercourse crossing works are required, effects can be reasonably excluded.
Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC
Rationale for Impact Evaluation: ● No watercourse crossing works required for UWF Other Activities
Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Spread of Aquatic Invasive Species
Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Shannon SAC - beyond

that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude:

There is the potential for introduction of non-native, invasive aquatic species at 64 No. watercourse crossing works locations, spread over the Lower River Shannon SAC regional catchment, associated with the Whole UWF Project. The impact magnitude is evaluated as Medium due to the presence of invasive species throughout the study area, established as the baseline condition and thus contributing to the risk of spread where infestations from one location to another. Effects are mitigated heavily with the implementation of a bespoke Invasive Species Management Plan (ISMP).

However the management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plans for UWF Grid Connection, Upperchurch Windfarm and UWF Related Works which includes Best Practice biosecurity measures and supervision by an invasive species specialist, this will ensure that the spread of invasive species is avoided, and therefore it is considered that this impact is unlikely to occur.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Cumulative Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species is evaluated as non-reversible.
- The location of the UWF Grid Connection predominately in a separate catchment to the Other Elements of the Whole UWF Project
- The implementation of the Invasive Species Management Plan for UWF Grid Connection, Upperchurch Windfarm and UWF Related Works, including best practice Biosecurity Protocols (IFI, 2010), will ensure that there is no likelihood of this effect occurring.

Qualifying Interests:

- No effects on QI Habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation via reductions in habitat area, occurrence, altered hydrological regime, structure and composition, riparian habitat, underlying water quality, typical species, floodplain connectivity and fringing habitats are expected.
- No effects on QI Habitat Alluvial Forests via reductions in habitat area, occurrence, distribution, woodland size, structure, woodland indicators, vegetative composition, altered hydrological regime are expected

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Spread of Aquatic Invasive Species

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:

There is the potential for introduction of non-native, invasive aquatic species at 64 No. watercourse crossing works locations, spread over the River Shannon hydrometric area, and associated with the Whole UWF Project. The impact magnitude is evaluated as Medium due to the presence of invasive species throughout the study area, established as the baseline condition and thus contributing to the risk of spread where infestations from one location to another.

With regard to Other Projects, it is considered that while Castlewaller Windfarm and the potential Bunkimalta Windfarm both have potential to spread invasive species that it is not likely to occur due to the expected implementation and adherence to Best Practice in the eradication and treatment of invasive species to ensure compliance with legislative requirements. Similarly the effects from agriculture, turbary and forestry are evaluated as negligible in magnitude as no contrast is expected in the context of background trends.

Effects are mitigated effectively with the implementation of a Best Practice derived Invasive Species Management Plan (ISMP) for UWF Grid Connection.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Shannon SAC**
Rationale for Cumulative Impact Evaluation: Whole UWF Project: ● The spread of aquatic invasive species is not restricted in extent to the footprint of the Whole UWF Project, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication. ● In this respect, the spread of aquatic invasive species are evaluated as non-reversible, however ● The implementation of the Invasive Species Management Plan for UWF Grid Connection, Upperchurch Wind-farm, and UWF Related Works, including best practice biosecurity protocols (IFI, 2010), and supervision by an invasive species specialist, will ensure that there is no likelihood of this effect occurring. Other Projects & Activities ● In addition, the construction of the other projects under consideration, will be obliged to meet its statutory requirements with regard to the introduction or spread of invasive species as set out in the European Communities (Birds and Natural Habitats) Regulations 2011, with specific reference to species listed in Annex III of those regulations.

6.7.3.2 Evaluation of SAC Impacts 4, 5, & 7

6.7.3.2.1 Effects on QI species (Fisheries and Other Species) along Pathway 4 from Direct mortality, within or ex-situ the Lower River Shannon SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: Instream works; culvert replacement works; operating machinery; excavation works; reinstatement

Other Unrelated Project/Activity Cumulative Impact Source: Instream works, operating machinery; excavation works; reinstatement

Impact Pathway: Direct contact;

Impact Description: No instream works are proposed within the Lower River Shannon SAC. Works such as cable trenching, road raising will occur at bridge locations within the official SAC boundary but which span over the SAC natural locations for fisheries- thus pathways exist for direct inadvertent mortality within the SAC in the absence of mitigation.

Although Fish are likely to mobilise outside of their territories due to human disturbance, and return once the disturbance effect diminishes some individuals may remain, and in the absence of intervention be subject to contact related pathways for mortality. Aquatic invertebrates are less sensitive to mortality arising from works/human activity and are scoped out from evaluation of mortality related effects. The extent of mortality of aquatic QI ecological receptors, i.e. fish, will be limited to the direct footprint of any instream works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations – i.e. Class 1 or Class 2 watercourses. Any mortality is irreversible.

Instream works and machinery operation within or in close proximity to any (i.e. *ex-situ*) upstream, hydrologically connected watercourse, has the potential to directly injure or kill salmonid fish and aquatic species within fish-bearing streams, which in turn interact with the natural functions of the downstream SAC.

Were the impacts described above to occur within a SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as distribution and numbers of adults and/or juveniles and through secondary effects on prey item species or host species, affect the supporting habitat quality for other QI Species.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Mortality to Fisheries

Authorised Upperchurch Windfarm

Impact Magnitude: None:

1 No. watercourse with fisheries value occurs within the footprint of the Upperchurch Windfarm site which is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. No effects are possible via mortality to fisheries to the Lower River Shannon SAC.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Lower River Shannon SAC.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Absence of connectivity between instream works and the Lower River Shannon SAC.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any additional instream works or culvert replacement works; and will not result in changes to construction activity (including use of machinery, earthworks, groundworks or reinstatement works) associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Shannon SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Shannon SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.

Evaluations of the Other Elements of the Whole UWF Project - Fisheries, Direct Mortality

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
The 1 no. watercourse crossing which is located in the Bilboa_SC_010 (and hence the regional Lower River Shannon SAC catchment) will not require any instream works. This watercourse has no fisheries suitability and comprises a dry field drain. The authorised crossing method involves the installation of cabling over or under the structure.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No instream works are required in the regional Lower River Shannon SAC catchment.

UWF Grid Connection (authorised)

Impact Magnitude:
Of the 63 No. watercourse crossings required for the UWF Grid Connection within the River Shannon catchment, 15 No. have been evaluated as locations with fisheries value.
Of these 15, 3 no. watercourse crossings (W7 at Rockvale bridge, W45 and W53 at Anglesey Bridge) with fisheries value are within the boundary of the Lower River Shannon SAC. The remaining 12 crossings occur at varying distances upstream hydrologically from the Lower River Shannon SAC e.g. up to 13.9km hydrologically for Watercourse crossing W39.
Of the 15 No. watercourses within the regional Shannon catchment, 2 No. watercourses at Mountphilips (W1, W3) will be subject of instream works and 1 No. watercourse along the 110kV UGC with fisheries value (W14) will be subject to potential culvert replacement works.
The remaining 12. No watercourses with fisheries value will not require instream works or culvert replacement works and can be excluded from further consideration. However, the crossing of the Newport River at W7, the crossing of the Clare (Annagh) River at W36 and the crossing of the Bilboa River at W53 – where works will occur within the SAC

boundary, but works take place over the watercourse crossing structure where the 110kV UGC will be installed within the existing bridge structures – may result in pathways for inadvertent mortality in the event of debris from parapet raising/re-surfacing material etc. falling over the bridge.
As part of Project Design, all works within the boundary of the Lower River Shannon SAC will take place during dry weather in the dryer parts of the year (GC-PD40, see Section 6.5.1), and all instream works will be supervised by a member of CIEEM and the Institute of Fisheries Management (GC-PD41)- in addition all works will be carried out in line with Best Practice (IFI, 2016 as per GC-PD49) and culvert replacement works will not take place without the isolation of flow within the respective watercourse, and translocation of fish by licensed fisheries personnel (GC-PD50). Finally, all works to bridge parapet walls will only be undertaken with the use of debris netting, affixed to the outside of walls to prevent debris falling into the river (GC-PD31). Given this the magnitude of any effect is evaluated as negligible.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC.

Rationale for Impact Evaluation:
- UWF Grid Connection Mitigation Measures for the protection of fisheries during works;;
- Separation buffers and Distance upstream from the SAC.

UWF Replacement Forestry (licensed)

Impact Magnitude:
No instream works are required. Located in the Suir catchment. Magnitude is zero.

Significance of the Impact: No adverse effects on European Site Integrity.

Rationale for Impact Evaluation:
- No instream works are required in the regional Lower River Shannon SAC catchment.

UWF Other Activities

There is no potential for aquatic habitat effects within or ex-situ to the Lower River Shannon SAC as there are no instream works required as a result of UWF Other Activities (including Overhead Line Activities, Haul Route Activities, and the Upperchurch Hen harrier Scheme).

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- Absence of connectivity. - no instream works

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Fisheries, Direct Mortality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude:

Whole UWF Project effects are limited to the UWF Grid Connection element only where, works or activities at 6 no. locations in total have the potential to be affect fisheries through mortality. Remaining project elements are anticipated to result in effects of negligible magnitude.
Substantial Mitigation Measures will be in place to avoid adverse effects on European Site Integrity with respect to the UWF Grid Connection element of the Whole UWF Project. Remaining project elements are primarily located in a differing regional catchment (the River Suir) and/or include or will include Project Design or Mitigation around instream works and the protection of the Aquatic Environment's receiving species.
Overall magnitude is evaluated as negligible in the context of the primarily downstream European Site under consideration.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- UWF Grid Connection Mitigation Measures for the protection of fisheries during works;
- The placement of the locations of instream works in respect of other Project Elements in a different regional catchment, and;

- Mitigation & Project Design in respect of other Elements/activities considered, in addition to separation buffers, and limited sources of direct mortality to fisheries;
- The low number of watercourses (6No. in total) with fisheries value and subject to works with the potential to result in mortality to fisheries;

Qualifying Interests:

- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Fisheries, Direct Mortality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:

Magnitude of effects from the Whole UWF Project is negligible, primarily due to the limited footprint of instream works-recognition is also made of Mitigation Measures for the protection of fish.

In respect of other plans or projects or activities, the cumulative magnitude is evaluated as negligible given that it is expected that there will be adherence to setback buffers from watercoursesfor certain projects, the implementation of consented mitigation, and the absence in contrast from baseline conditions expected for background activities such as Forestry, Agriculture and Turf-cutting, and the expected inclusion of Best Practice mitigation measures in any future applications for Bunkimalta Windfarm or Castlewaller Windfarm grid connection. Overall Cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Shannon SAC**

Rationale for Impact Evaluation:

- UWF Grid Connection Mitigation Measures for the protection of fisheries during works;
- The placement of the locations of instream works in respect of other Project Elements in a different regional catchment, and;
- Mitigation & Project Design in respect of other Elements/activities considered, in addition to separation buffers, and limited sources of direct mortality to fisheries;
- The low number of watercourses (6 No. in total) with fisheries value and subject to works with the potential to result in mortality to fisheries;

Other projects & activities

- Construction activities for Castlewaller Windfarm and the potential Bunkimalta Windfarm (assumed) will be at least a minimum of 50m from watercourses where possible; and it is expected that Best Practice measures in relation to the protection of aquatic species will be included in any future application for the Castlewaller grid connection or any future Bunkimalta Windfarm proposal.
- No instream works associated with Rear Cross quarry. The separation distance and physical isolation of the existing quarry at Rearcross;
- No material changes to existing baselines in respect of Agriculture, Forestry and Turf-cutting are expected or planned in the area, with limited potential for instream works in watercourses from these activities.

6.7.3.2.2 Effects on QI species (Fisheries and Other Species) along Pathways 5 & 7 from Disturbance or Displacement within or ex-situ the Lower River Shannon SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: instream works; culvert replacement works; operating machinery; excavation works; noise and human disturbance; drilling works; reinstatement works

Other Unrelated Project/Activity Cumulative Impact Source: Instream works, operating machinery; excavation works; noise and human disturbance; reinstatement

Impact Pathway: direct contact; ground and air vibrations

Impact Description: Instream works and machinery operation within or in close proximity to any watercourse either comprising natural locations within the SAC or ex-situ supporting locations upstream, has the potential to directly disturb or displace salmonid fish and aquatic species within fish-bearing streams, or sensitive aquatic receptors. Fish are likely to mobilise outside of their territories due to human disturbance, but will return once the disturbance effect diminishes (i.e. brief temporary effect). Aquatic invertebrates are less sensitive to disturbance and displacement arising from human activity and are scoped out from evaluation of disturbance/displacement effects in the context of European Sites. The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any instream works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations – i.e. Class 1 or Class 2 watercourses either within or ex-situ the SAC. Disturbance or displacement effects will be brief to temporary in nature, lasting for the duration of works at or in close proximity to Class 1 or Class 2 watercourses.

Were the impacts described above to occur within a SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as distribution and numbers of adults and/or juveniles and through secondary effects on prey item or host species, affect the supporting habitat quality for other QI Species.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Disturbance / Displacement of Fisheries

Authorised Upperchurch Windfarm

Impact Magnitude: None: 1 No. watercourse with fisheries value occurs within the footprint of the Upperchurch Windfarm site and is located entirely within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. No effects are possible via disturbance/displacement of aquatic species to the Lower River Shannon SAC.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Lower River Shannon SAC.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Absence of connectivity between instream works and the Lower River Shannon SAC.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None – absence of impact sources

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any any additional instream works or culvert replacement works; and will not result in changes to construction activity (including use of machinery, earthworks, groundworks or reinstatement works) or construction personnel associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Shannon SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Shannon SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected..

Evaluations of the Other Elements of the Whole UWF Project - Fisheries, Disturbance or displacement

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019. Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
The 1 no. watercourse crossing which is located in the Bilboa_SC_010 (and hence the regional Lower River Shannon SAC catchment) will not require any instream works. This watercourse has no fisheries suitability and comprises a dry field drain. The authorised crossing method involves the installation of cabling over or under the structure.
The magnitude of any disturbance on fisheries is evaluated as negligible.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No instream works in watercourses with fisheries value are required in the regional Lower River Shannon SAC catchment.

UWF Grid Connection (authorised)

Impact Magnitude:
Of the 63 No. watercourse crossings required for the UWF Grid Connection in the River Shannon catchment, 15 No. have been evaluated to have fisheries value.
Of the 15 No. watercourses, 2 No. watercourses at Mountphilips (W1, W3) will be subject of new instream works and 1 No. watercourse along the 110kV UGC (W14) will be subject to culvert replacement works. All are located outside the SAC but within the regional River Shannon catchment and are therefore outside the SAC but hydrologically connected at varying distances (W1:3.3km, W3:3.75km and W14:6km).
Due to the location of works in the watercourse, there will be some localised effects at these discrete locations, however the magnitude of disturbance effects at these locations is evaluated as Slight to Moderate in the local context. There will no disturbance to fisheries in their natural location within the SAC and given the separation distances involved, the impact magnitude on the SAC is evaluated as negligible.
The remaining 12. No watercourses with fisheries value will not require either new instream works or culvert replacement works. This includes the crossing of the Newport River at W7, the crossing of the Clare River at W36 and

the crossing of the Bilboa River at W53 – where the 110kV UGC will be installed within the existing bridge structures with works also required to raise the road level and increase the height of parapet walls, within the SAC boundary but not within natural locations for fish or aquatic species. The installation of the 110kV UGC at the other watercourses with fisheries value (W5, W8, W9, W18, W33, W38, W39, W45, W49) will not involve instream works or culvert replacement works within the SAC as the cables will be installed either under or over the existing structures, therefore the magnitude of disturbance effects at these locations only relates to works in the public road pavements and is evaluated as Negligible to low. There may be occasional, very short duration disturbance to fish populations utilising habitat beneath bridges; however, this will not result in displacement, loss of territory, or holding habitat to any noticeable degree and effects on SAC QI Species are evaluated as negligible in this regard for the watercourses considered above.

Disturbance may also occur at drilling locations (W8, W9) with the magnitude of disturbance impacts due to noise or vibration evaluated as Low. Similarly, due to the very short duration and nature of drilling works, these works will not result in displacement, loss of territory, or holding habitat. It should be noted that the drilling works at W8 and W9 are not within the Lower River Shannon SAC boundary. The Magnitude of any disturbance on the SAC QI Species under consideration is evaluated as negligible.

Authorised works including trench excavation, bridge works, culvert replacement, directional drilling, and resurfacing may give rise to disturbance to fish and aquatic biodiversity receptors present within Class 1 and Class 2 watercourses over a period of c.1 – 2 days at each crossing location (and c. 2 to 5 days at drilling locations). The frequency of these disturbance effects is once only for cables trenches with or without new permanent culverts.

As part of Project Design, all works within the boundary of the Lower River Shannon SAC will take place during dry weather in the dryer parts of the year (GC-PD40, see Section 6.5.1), and all instream works will be supervised by a member of CIEEM and the Institute of Fisheries Management (GC-PD41)- in addition all works will be carried out in line with Best Practice (IFI, 2016 as per GC-PD49) and culvert replacement works will not take place without the isolation of flow within the respective watercourse, and translocation of fish by licensed fisheries personnel (GC-PD50). Finally, all works to bridge parapet walls will only be undertaken with the use of debris netting, affixed to the outside of walls to prevent debris falling into the river (GC-PD31).

Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No instream works will take place within the SAC;
- In-stream works which do occur will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design);
- The Class 1 and Class 2 watercourses W1, W3 and W14, where in-stream works are required, are small first order streams ex-situ the SAC and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing. All fish and Annex II listed species (White-clawed crayfish) will be translocated to suitable habitat in immediate proximity downstream, within the same watercourse. This will be completed under license and following standard protocols; (Project Design);
- The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of instream works at W1 and W3 and any potential culvert replacement works at W14.
- The frequency of disturbance effects will be once for works at W1, W3 and W14,
- The duration of any disturbance impacts is considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.
- The implementation of UWF Grid Connection Mitigation Measures for the protection of fisheries

UWF Replacement Forestry (licensed)

Impact Magnitude: Located outside the River Shannon catchment. No instream works are required. Magnitude is zero.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Absence of connectivity with the River Shannon SAC

UWF Other Activities

There is no potential for aquatic habitat effects within or ex-situ to the Lower River Shannon SAC as there are no instream works required as a result of UWF Other Activities (including Overhead Line Activities, Haul Route Activities, and the Upperchurch Hen Harrier Scheme). The Upperchurch Hen Harrier scheme is located entirely within the regional River Suir catchment.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No instream works, and absence of connectivity between works in close proximity to watercourses and the Lower River Shannon SAC.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Fisheries, Disturbance or displacement

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude:

Direct disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works or culvert replacement works and directly upstream and downstream of all crossings, temporary and permanent instream works structures, bank-side works and construction works adjacent to watercourses and over existing crossing structures and is limited to the effects of the UWF Grid Connection Element within the River Shannon Regional Catchment where no works will take place within the SAC - evaluated as negligible.

As part of Project Design, all works within the boundary of the Lower River Shannon SAC will take place during dry weather in the dryer parts of the year (GC-PD40, see Tab 1 of the accompanying EMP), and all instream works will be supervised by a member of CIEEM and the Institute of Fisheries Management (GC-PD41)- in addition all works will be carried out in line with Best Practice (IFI, 2016 as per GC-PD49) and culvert replacement works will not take place without the isolation of flow within the respective watercourse, and translocation of fish by licensed fisheries personnel (GC-PD50). Finally, all works to bridge parapet walls will only be undertaken with the use of debris netting, affixed to the outside of walls to prevent debris falling into the river (GC-PD31).

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No instream works will take place within the SAC;
- Implementation of UWF Grid Connection Mitigation Measures for the protection of fisheries
- Implementation of Mitigation Measures (other elements) for the protection of fisheries;
- Limited works from other project elements within the River Shannon regional catchment with the potential to disturb fisheries;
- The frequency of disturbance effects will be once;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

Qualifying Interests:

- No effects on QI Species (Lamprey spp.) via reductions in Abundance or distribution, population structure, juvenile density, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Species (Atlantic Salmon) via reductions in Abundance or distribution (including adults, salmon fry and out migrating smolt), reduced accessibility, or supporting habitat quality are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities – Fisheries, Disturbance or displacement

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River

Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: Magnitude of effects from the Whole UWF Project is negligible, primarily due to the limited footprint of instream works- recognition is also made of Project Design measures for the protection of fish. In respect of other plans or projects or activities, the cumulative magnitude is evaluated as negligible given that it is expected that there will be adherence to setback buffers from watercourses, separation distance from watercourses for certain projects, the implementation of consented mitigation, and the absence in contrast from baseline conditions expected for background activities such as Forestry, Agriculture and Turf-cutting, and the expected inclusion of Best Practice mitigation measures in any future applications for Bunkimalta Windfarm or Castlewaller grid connection. Overall Cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Shannon SAC**

Rationale for Impact Evaluation:

Whole UWF Project:

- No instream works will take place within the SAC;
- Project design measures for the protection of fisheries;
- Limited works from other project elements within the River Shannon regional catchment with the potential to disturb fisheries;
- The frequency of disturbance effects will be once;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

Other Projects or Activities:

- Construction activities for Castlewaller Windfarm and the potential Bunkimalta Windfarm (assumed) will be at least a minimum of 50m from watercourses where possible; and it is expected that Best Practice measures in relation to the protection of aquatic species will be included in any future application for the Castlewaller grid connection or any future Bunkimalta Windfarm proposal.
- No instream works associated with Rear Cross quarry. The separation distance and physical isolation of the existing quarry at Rearcross;
- No material changes to existing baselines in respect of Agriculture, Forestry and Turf-cutting are expected or planned in the area, with limited potential for instream works in watercourses from these activities.

6.7.3.2.3 Effects on QI species (Otter) along Pathway 4 from Direct mortality, within or ex-situ the Lower River Shannon SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: instream works; culvert replacement works; operating machinery; excavation works; reinstatement works

Other Unrelated Project/Activity Cumulative Impact Source: Instream works, operating machinery; excavation works; reinstatement

Impact Pathway: direct contact

Impact Description: Otter are rated as a very high sensitivity receptor (based on International importance ratings) and may be sensitive to mortality through inadvertent collision with moving vehicles or machinery, in particular during hours of darkness. As no active holts were located within 300m (upstream or downstream) of works locations in proximity to suitable Otter habitat (i.e. at watercourse crossing locations) then effects are reduced to potential mortality of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors and /or whilst crossing roads in close proximity to proposed works. Many of the watercourses present form part of or are hydrologically connected to the Lower River Shannon SAC which includes Otter as a Qualifying Interest.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI Species and Conservation objectives such as a decline in range and/or distribution and numbers of individuals within the Lower River Shannon SAC.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude ,degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on connected or supporting populations for downstream but ecologically connected Qualifying Interest (QI) species, thus affecting Site Integrity/Conservation Objectives similarly.

These effects are reduced by an adherence to Project Design (UWF Grid Connection, UWF Related Works), i.e. completing works during daylight hours. All works will be completed in line with the traffic management plan which forms part of the accompanying EMP (GC-PD10) and traffic movements will be limited in respect of refuelling near watercourses; in addition to specific measures around the protection of Otter, such as confirmatory surveys, the limiting of works within 150m of any confirmed active Otter holts and the establishment of a prohibited area associated with confirmed active Otter holts. Traffic management measures (restriction of vehicular speeds, e.g. 25km/hr at Mountphilips Substation site) will also contribute to reducing potential collision mortality.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Otter, Mortality

Authorised Upperchurch Windfarm

Impact Magnitude: No Otter were recorded during windfarm surveys; therefore, the impact magnitude in respect of potential mortality is expected to be Negligible. Only 1 no. water course crossing is required, located within the regional River Suir catchment.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Lower River Shannon SAC.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No watercourse crossings are located within the regional River Shannon catchment;
- No active holts or resting places were recorded in baseline studies for the windfarm;
- watercourses in the windfarm area generally comprise drains which have marginal habitat value to otter;
- Works will be of temporary duration.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any additional instream works or culvert replacement works; and will not result in changes to construction activity (including use of machinery, earthworks, groundworks or reinstatement works) associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Shannon SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Shannon SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluations of the Other Elements of the Whole UWF Project - Otter, Mortality

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019. Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: 32 No. watercourse crossings in total are required for UWF Related Works with instream works required at 25 No. of these crossings. However only 1 no. watercourse crossing is located in the Bilboa_SC_010 (and hence the regional Lower River Shannon SAC catchment) and will not require any instream works. This watercourse has no fisheries suitability and comprises a dry field drain. The authorised crossing method (A1) involves the installation of cabling over or under the structure. The Magnitude of any effects through direct contact with Otter at this location is evaluated as Negligible.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Application of project design measures for the protection of Otter,
- No active holts were identified overlapping the construction area boundaries or within 150m, suggesting limited usage by Otter, and;
- The nature of the single watercourse crossing in the Bilboa sub-catchment.
- Works will take place during daylight hours only, and;
- Be of brief-temporary duration.

UWF Grid Connection (authorised)

Impact Magnitude:
Out of the 68 watercourse crossings along the UWF Grid Connection route, 26 watercourses were identified from surveys of all watercourse crossing locations, as having potential to support Otter and were therefore surveyed 300m upstream and downstream of the crossing for the presence of Otter – all located within the regional catchment of the River Shannon SAC. Out of these 26 watercourses surveyed, evidence of Otter was found at three watercourse crossings locations or their environs (W33, W36 and W53). No active breeding or resting sites (Holts or Couches) were identified however.

The evidence of Otter found at three watercourse crossings locations (W53, W33 and W36) relates to a total of four records of Otter within the UWF Grid Connection study area, consisting of slides and spraints. One of the four records was recorded along the River Bilboa within the Lower River Shannon SAC, and consisted of an Otter slide, recorded approximately 60 metres downstream of watercourse crossing W53. Two records were recorded along the Tooreenbrien Lower River, consisting of an Otter spraint approximately 45 metres downstream of watercourse crossing W33 with an Otter print recorded underneath the W33 bridge structure. The fourth Otter record relates to an Otter slide which was recorded along the Annagh (Clare) River, approximately 135 metres upstream of watercourse Crossing W36. No Otters were observed, although this is typical in respect of a species where most activity takes place at night.

110kV UGC works over, and in close proximity to W53, W33 and W36 will involve the excavation of cable trenches and installation of ducting, and reinstatement of the trench. No instream works or culvert replacement works will be required at any of these crossings with the 110kV UGC installed in the road over the existing bridge structures, and although the parapet walls will need to be raised/built higher at W53 and W36, these works are not expected to be longer than 2 weeks in duration (expected duration range 1 day to 2 weeks dependant on location) with all works to parapet walls taking place from the road surface over the bridges.

All of the above plus additional trenching and cable laying works will require traffic movements and/or the operation of machinery with which Otter could conceivably undergo direct contact resulting in mortality.

However, considering the temporary duration of works at watercourse crossings and the scale of the authorised works, along with project design measures in place during works to protect Otter and ensure works take place during daylight hours, the magnitude of impact in relation to direct mortality of Otter is expected to be negligible.

When the absence of holts within 300m is taken into account, it is considered that there is no likelihood of significant mortality impacts.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Implementation of UWF Grid Connection Mitigation Measures for the protection of Otter;
- The very high sensitivity rating of the species, and Negligible magnitude of impact;
- The irreversible nature of mortality effects;
- Recorded Otter evidence in close proximity to 3 identified crossings, in particular W53 where parapet works will take place over the Lower River Shannon SAC, however;
- No Holts or resting places occur in close proximity, and;
- Works will take place during daylight hours, with;
- In the context of works at larger watercourses will take place in an existing public road subject to the passage of traffic, to which Otter will be habituated.

UWF Replacement Forestry (licensed)

Impact Magnitude: No active holts or resting places were recorded in baseline studies and all planting will be done by hand. All works are located in the River Suir regional catchment. Therefore, impact magnitude is expected to be zero.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No works are to take place within the regional River Shannon catchment.
- No active holts or resting places were recorded in baseline studies, and;
- All planting will be done by hand, and;
- Undertaken during daylight hours
- The irreversible nature of mortality effects;
-

UWF Other Activities

Impact Magnitude: No otter holts or resting places were recorded at Haul Route Activity locations. The locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours with minimal machinery as a potential source of collision mortality. Works as part of the Upperchurch Hen Harrier Scheme will take place within the catchment of the Lower River Suir SAC and can be excluded. Therefore, the impact magnitude is expected to be Negligible

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- No otter holts or resting places were recorded at Haul Route Activity locations, and;
- Locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours, with;
- Limited machinery to act as potential sources of collision mortality;

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Otter, Mortality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude Construction works involving the use of machinery and excavation work at watercourse crossing points (both existing and new crossing points) will occur across a wide area within the River Shannon catchment. There is potential to cause mortality of otter at larger watercourse crossing points and/or through traffic and machinery movements. These larger watercourses occur along the UWF Grid Connection, whereas the single watercourse on the UWF Related Works requiring consideration is essentially a field drain with marginal habitat value to otter.

In relation to in-combination effects of the Whole UWF Project, there is no potential for cumulative additive effects to Otters from the Upperchruch Windfarm due to the absence of Otter recorded at the site, or from UWF Related Works due to the absence of Otter recorded at the watercourses common to both these project elements and the Lower River Shannon SAC regional catchment. There is no potential for cumulative effects of the UWF Replacement Forestry with the Other Elements due to the location of UWF Replacement Forestry within the Lower River Suir SAC regional catchment. The magnitude of the in-combination effect of the Whole UWF Project, where considered in its entirety is in the order of UWF Grid Connection – i.e. Negligible. In total 3 no. watercrossing points (W33, W36 and W53) along the public road had signs of Otter use within 150m, the nearest of these crossing points (W53) is separated from UWF Related Works by ca.3km (to the nearest outlying works location- with most locations ca.4km or more) therefore there is no likelihood of additive cumulative effects to individual Otters from both the UWF Grid Connection works and UWF Related Works.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:
- Implementation of UWF Grid Connection Mitigation Measures for the protection of Otter;
- Project Design measures (other elements) to avoid working during daylight hours and to ensure the general protection of Otter will avoid adverse effects.
- The absence of Otter records at the Upperchurch Windfarm and UWF Related Works sites;
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;
- in the context of crossing locations as part of UWF Grid Connection comprising trenching works/parapet or road raising works within existing bridges where the works overlap the Lower River Shannon SAC, which has Otter as a Qualifying Interest, with;
- Recorded evidence of Otter in close proximity.

Qualifying Interests:
- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities – Otter, Mortality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower

River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:

The magnitude of impact predicted for the Whole UWF Project is essentially in the order of the UWF Grid Connection element, given the limited geographical overlap and records of Otter from other Project elements within the regional Lower River Shannon SAC catchment.

In relation to other projects, consideration is given to the traffic requirement for Rearcross Quarry as a potential source of mortality, however no records of Otter mortality were found in a review of roadkill on Biology.ie[22], overlapping the R503 (where in combination effects could reasonably be considered likely) or regional roads facilitating access to Castlewaller or Bunkimalta proposed development locations. Otter will also be habituated to existing traffic. Thus no contrast to existing baseline conditions is anticipated, and it is therefore considered that the magnitude of any potential cumulative effects is evaluated as negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Shannon SAC**

Rationale for Impact Evaluation:

- Implementation of UWF Grid Connection Mitigation Measures for the protection of Otter;
- Project Design measures (Other Element) to avoid working during daylight hours and to ensure the general protection of Otter will avoid adverse effects.
- The absence of Otter records at the UWF Related Works;
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;
- in the context of crossing locations as part of UWF Grid Connection comprising trenching works/parapet or road raising works within existing bridges where the works overlap the Lower River Shannon SAC, which has Otter as a Qualifying Interest, with;
- Recorded evidence of Otter in close proximity to locations along the 110kV UGC route.

Other Projects or Activities:

- Absence of Otter records from baseline studies for Castlewaller Windfarm and Bunkimalta Windfarm (2013)
- Construction activities for Castlewaller Windfarm and the potential Bunkimalta Windfarm are expected to be at least a minimum of 50m from watercourses where possible; and these projects including their gird connections, are expected to include measures to protect Otter, given the location of the SAC downstream of both sites.
-
- The separation distance and physical isolation of the existing quarry at Rearcross;
- No material changes to existing baselines in respect of Agriculture, Forestry and Turf-cutting are expected or planned in the area, with limited potential for mortality related pathways from these activities.
- Absence of baseline records of roadkill from the area under consideration, suggesting little contrast to existing baseline conditions.

[22] http://www.biology.ie/mapf.php?m=npws

6.7.3.2.4 Effects on QI species (Otter) along Pathways 5 & 7 from Disturbance / Displacement, within or ex-situ the Lower River Shannon SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: noise and human disturbance; visual intrusion

Other Unrelated Project/Activity Cumulative Impact Source: Noise and Visual Intrusion

Impact Pathway: air, visibility

Impact Description: Otter are rated as a very high sensitivity receptor (based on International importance ratings) and do not tolerate disturbance at or near holts (breeding dens) that are in active use (breeding may occur at any time of the year, but most likely during the Summer/early Autumn period). When Otters are not breeding, records suggest that Otters are less sensitive to human disturbance (Chanin, 2013). As no active holts were located within 300m (upstream or downstream) of works locations in proximity to suitable Otter habitat (i.e. at watercourse crossing locations) then effects are reduced to disturbance/displacement of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors. This could include the disturbance of animals at resting places (couches). Watercourses are present which form part of or are hydrologically connected to European Sites (SAC's) suggesting the potential for secondary disturbance/displacement effects on this QI species both within and ex-situ the European Site under consideration.

Were the impacts described above to occur within an SAC watercourse it may (dependant on magnitude of source and response) result in direct adverse effects on QI Species and Conservation objectives such as a decline in range and/or distribution and numbers of individuals within the Lower River Shannon SAC catchment.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on connected or supporting populations for downstream but ecologically connected Otter. These effects are reduced by an adherence to Project Design Measures, ie. completing works during daylight hours only; All works will be completed in line with the traffic management plan which forms part of the accompanying EMPs and traffic movements will be limited in respect of refuelling near watercourses, in addition to specific measures around the protection of Otter, such as confirmatory surveys, the limiting of works within 150m of any confirmed active Otter holts and the establishment of a prohibited area associated with confirmed active Otter holts.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Otter, Disturbance/Displacement

Authorised Upperchurch Windfarm

Impact Magnitude: No Otter were recorded during windfarm surveys; and as the wind farm is located almost entirely (20 of 22 turbine locations) within the regional River Suir catchment, therefore the impact magnitude of any disturbance is expected to be Negligible. In addition, watercourses within the windfarm generally comprise drains with marginal habitat to otter.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Lower River Shannon SAC.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No active holts or resting places were recorded in baseline studies for the windfarm;
- watercourses in the windfarm area generally comprise drains which have marginal habitat value to otter and;
- works will be of temporary duration.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: : None – absence of sources of impact

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation: No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to the levels of noise, human disturbance or visual intrusion during construction works as the amendment will not result in any changes to the levels, duration, intensity or locations of construction activities associated with the authorised windfarm and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Lower River Shannon SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Lower River Shannon SAC
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected..

Evaluations of the Other Elements of the Whole UWF Project – Otter, Disturbance / Displacement

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019. Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

Cumulative Information: Other Elements of the Whole UWF Project

UWF Related Works (authorised)

Impact Magnitude:
32 No. watercourse crossings in total are required for UWF Related Works with instream works required at 25 No. of these crossings. However only 1 no. watercourse crossing is located in the Bilboa_SC_010 (and hence the regional Lower River Shannon SAC catchment) and will not require any instream works. This watercourse has no fisheries suitability and comprises a dry field drain. The authorised crossing method involves the installation of cabling over or under the structure. The Magnitude of any effects through noise or visual intrusion with Otter at this location is evaluated as Negligible.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Only a single watercourse crossing of a field drain comprising marginal habitat for Otter is relevant;
- Application of project design measures for the protection of Otter,
- No active holts were identified overlapping the construction area boundaries or within 150m, and;
- Works will take place during daylight hours only, and;
- Be of brief-temporary duration.

UWF Grid Connection (authorised)

Impact Magnitude:
Out of the 63 watercourse crossings along the UWF Grid Connection route within the River Shannon catchment, 26 watercourses were identified from surveys of all watercourse crossing locations, as having potential to support Otter and were therefore surveyed 300m upstream and downstream of the crossing for the presence of Otter. Out of these 26 watercourses surveyed, evidence of Otter was found at three watercourse crossings locations or their environs. No active breeding or resting sites (Holts or Couches) were identified, however.

The evidence of Otter found at three watercourse crossings locations (W53, W33 and W36) relates to a total of four records of Otter within the UWF Grid Connection study area, consisting of slides and spraints. One of the four records was recorded along the River Bilboa within the Lower River Shannon SAC, and consisted of an Otter slide, recorded approximately 60 metres downstream of watercourse crossing W53. Two records were recorded along the Tooreenbrien Lower River, consisting of an Otter spraint approximately 45 metres downstream of watercourse crossing W33 with an Otter print recorded underneath the W33 bridge structure. The fourth Otter record relates to an Otter slide which was recorded along the Annagh (Clare) River, approximately 135 metres upstream of watercourse Crossing W36. No Otters were observed, although this is typical in respect of a species where most activity takes place at night.

110kV UGC works over, and in close proximity to W53, W33 and W36 will involve the excavation of cable trenches and installation of ducting, and reinstatement of the trench. No instream works or culvert replacement works will be required at any of these crossings with the 110kV UGC installed in the road over the existing bridge structures, and although the parapet walls will need to be raised/built higher at W53 and W36, these works are not expected to be longer than 2 weeks in duration (expected duration range 1 day to 2 weeks dependant on location) with all works to parapet walls taking place from the road surface over the bridges.

Considering the temporary duration of works at watercourse crossings and the scale of the authorised works, along with measures in place during works (GC-OCM-17) the magnitude of impact in relation to disturbance of Otter is expected to be negligible.

Significance of the Impact: No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- The very high sensitivity rating of the species, and Negligible magnitude of impact;
- Recorded Otter evidence in close proximity to 3 identified crossings, in particular W53 where parapet works will take place over the Lower River Shannon SAC, however;
- No Holts or resting places occur in close proximity, and;
- Works will take place during daylight hours, and from the surface of the bridge only, with;
- Very slight contrast to existing baseline conditions is expected, given the majority of works take place in an existing road subject to heavy passage of traffic, to which Otter will be habituated;
- The brief-temporary duration of disturbance events and any corresponding effect, with
- Effects expected to be reversible, and;
- Application of UWF Grid Connection Mitigation Measures for the protection of Otter, including at all watercourse crossing locations.

UWF Replacement Forestry (licensed)

Impact Magnitude: No active holts or resting places were recorded in baseline studies and all planting will be done by hand. All works are within the regional River Suir catchment. Therefore impact magnitude is expected to be zero.

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Zero overlap with regional catchment of the River Shannon SAC;
- No active holts or resting places were recorded in baseline studies, and;
- All planting will be done by hand, and;
- Undertaken during daylight hours, and
- Of temporary duration;
- No significant contrast to baseline conditions is expected.
- Any effect will be reversible, given the low magnitude of source disturbance.

UWF Other Activities

Impact Magnitude: No otter holts or resting places were recorded at Haul Route Activity locations, and the locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours.

- Riparian zone enhancement as part of UHHS will take place within the regional River Suir catchment.
- Therefore, the impact magnitude is expected to be Negligible

Significance of the Impact: No adverse effect on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- No otter holts or resting places were recorded at Haul Route Activity locations, and;
- Locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours;
- The offsetting effects of long-term management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing Otter habitat – including the enhancement of riparian corridors.
- The low reversibility of the above described management.
-

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Otter, Disturbance / Displacement

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude:

Construction works involving the use of machinery and excavation work at watercourse crossing points (both existing and new crossing points) will occur across a wide area within the River Shannon catchment. There is potential to cause disturbance or displacement of otter at larger watercourse crossing points. These larger watercourses occur along the UWF Grid Connection, whereas the watercourses on the Upperchurch Windfarm site are drains, and where UWF Related Works overlap the regional Lower River Shannon SAC catchment are mainly drains and larger drains/watercourses with marginal habitat value to otter. Sequential effects could occur where Otters foraging or transiting along watercourses experience multiple sources of instruction/disturbance in quick succession such as encountering work crews undertaking construction activities.

In relation to in-combination effects of the Whole UWF Project, there is no potential for cumulative additive effects to Otters from both the UWF Related Works and the Upperchurch Windfarm due to the absence of Otter recorded at the watercourses within these sites and the placement of most of Upperchurch Windfarm within the Lower River Suir SAC Regional catchment. There is no potential for cumulative effects of the UWF Replacement Forestry with the Other Elements due to the UWF Replacement Forestry also being located in the River Suir regional catchment. The magnitude of the in-combination effect of the Whole UWF Project, where considered in its entirety is in the order of UWF Grid Connection – i.e. Negligible. In total 3 no. watercrossing points (W33, W36 and W53) along the public road had signs of Otter use within 300m.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Lower River Shannon SAC

Rationale for Impact Evaluation:

- Application of UWF Grid Connection Mitigation Measures for the protection of Otter;
- The absence of Otter records at the UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm study areas and the geographical placement of substantial works within a differing regional catchment to that under consideration, and the inclusion of project design measures (other elements) for the protection of otter;
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;
- in the context of crossing locations as part of UWF Grid Connection comprising trenching works/parapet or road raising works within existing bridges where the works overlap the Lower River Shannon SAC, which has Otter as a Qualifying Interest, with;
- Recorded evidence of Otter in close proximity, and
- Potential (albeit unlikely) for sequential effects

Qualifying Interests:

- No effects on QI Species (Otter) via reductions in Abundance or distribution, extent of terrestrial, freshwater and marine habitat, barrier effect, supporting habitat or supporting habitat quality (including fish biomass) are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Otter, Disturbance / Displacement

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Lower River Shannon SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: Impact magnitude from the Whole UWF Project has been evaluated as negligible, and is essentially in the order of the proposed UWF Grid Connection, the project element which has specific design/mitigation measures for the avoidance of effects on Otter.

In relation to in-comination effects with Rearcross Quarry, Castlewaller Windfarm (and potential grid connection), and the potential Bunkimalta Windfarm (and consented grid connection), it is considered that the magnitude of any cumulative effects will be negligible due to the upland nature of the windfarm sites and the absence of otter evidence during baseline studies, and the limited zone of effect (spatial and temporal) and the separation distance upstream from the UWF Grid Connection, and no instream works or works in close proximity to a watercourse are required as part of Rearcross Quarry.

In relation to in-comination effects with forestry, agriculture and turf-cutting activities: these activities are on-going, form part of the baseline conditions, and have limited exposure to pathways likely to result in disturbance/displacement given a likely degree of habituation to these background activities. No material changes in agricultural/forestry/turf-cutting practices are expected or planned in the area.

Overall Impact Magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Lower River Shannon SAC**

Rationale for Impact Evaluation:

Whole UWF Project:

- Application of UWF Grid Connection Mitigation Measures for the protection of Otter;
- The absence of Otter records at the UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm study areas and the geographical placement of substantial works within a differing regional catchment to that under consideration, and the inclusion of project design measures (other elements) for the protection of otter;
- Works will take place during daylight hours, and will be brief-temporary in duration;
- The very high sensitivity of the species, and Negligible cumulative magnitude;
- in the context of crossing locations as part of UWF Grid Connection comprising trenching works/parapet or road raising works within existing bridges where the works overlap the Lower River Shannon SAC, which has Otter as a Qualifying Interest, with;
- Recorded evidence of Otter in close proximity, and
- Potential (albeit unlikely) for sequential effects

Other Projects or Activities:

- Absence of Otter records from baseline studies for Castlewaller Windfarm and Bunkimalta Windfarm (2013)
- Construction activities for Castlewaller Windfarm and the potential Bunkimalta Windfarm are expected to be at least a minimum of 50m from watercourses where possible; and these projects including their gird connections, are expected to include measures to protect Otter, given the location of the SAC downstream of both sites.
- The separation distance and physical isolation of the existing quarry at Rearcross;
- No material changes to existing baselines in respect of Agriculture, Forestry and Turf-cutting are expected or planned in the area, with limited potential for disturbance/displacement related pathways from these activities.
- Habituation to these background forestry, agriculture and turf-cutting activities.

6.7.4 Summary of the Impact of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts Amendment) on Qualifying Interests of the Lower River Shannon SAC

This section of the NIS has provided further evaluation of the source-impact pathways identified at Stage 1 Screening as having the potential to result in likely significant effects on the Lower River Shannon SAC and its respective Qualifying Interests screened in for further appraisal.

This has included potential effects on QI habitats and species from decreases in instream aquatic habitat quality, changes to flow regime, riparian habitat degradation, and the spread of invasive species. Potential effects on QI Species examined have included direct mortality of fisheries and other aquatic species, disturbance to or displacement of fisheries, along with mortality of and disturbance to or displacement of Otter. The Qualifying Interests screened in for evaluation at Stage 2 were:

Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
Alluvial Forests (91E0) * (priority habitat)
Atlantic Salmon [1106] Sea Lamprey [1095] Brook Lamprey [1096] River Lamprey [1099] Otter [1355]

The above Qualifying Interests both habitats and species have been subject to further examination in respect of their specific sensitivities & Conservation Objectives as to whether the identified pathways/effects can be considered likely to result in adverse effects on European Site Integrity via effects on Conservation Objectives; this has concluded that:

- No effects on QI Habitat Alluvial Woodland via reductions in habitat area, distribution or size, altered hydrological regime or structure and composition are expected.
- No effects on QI Species (Atlantic Salmon or Lamprey spp.) via reductions in Abundance or distribution, or supporting habitat (juvenile and/or spawning habitat) quality are expected.
- No effects on QI Habitat Floating River Vegetation via reductions in habitat area, distribution or size, altered hydrological regime, structure and composition, riparian habitat or connectivity are expected.
- No effects on QI Species Otter via reductions in Abundance or distribution, barrier effect, supporting habitat or supporting habitat quality (including prey item abundance) are expected.

Cognisance has been given at this stage to the various Mitigation Measures (see Section 6.5.1) designed to specifically avoid adverse effects on European Site Integrity, and to in-combination effects with both other project elements of the Whole Upperchurch Windfarm Project in addition to other plans, projects or activities, or consented projects within the defined temporal and spatial overlap for cumulative or in combination effects. Effects both within and without (i.e. ex-situ) the Lower River Shannon have been considered.

Table 6-21, overleaf in Section 6.7.5 summarises the evaluation of the impact of the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities, on the Integrity of the Lower River Shannon SAC.

6.7.5 Evaluation of the impact of the Whole UWF Project, including the Proposed Larger Turbines and Met Masts, on the Integrity of the Lower River Shannon SAC

Using the checklist in the Table below, the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities, is examined, for adverse impacts on the integrity of the Lower River Shannon SAC.

Table 6-21: Integrity of Site checklist

Does the project or plan have the potential to:	**Yes/No**
- cause delays in progress towards achieving the conservation objectives of the site?	No
- interrupt progress towards achieving the conservation objectives of the site?	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No
- change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No
- reduce the area of key habitats?	No
- reduce the population of key species?	No
- change the balance between key species?	No
- reduce diversity of the site?	No
- result in disturbance that could affect population size or density or the balance between key species?	No

The evaluation herein has found, that following the examination and analysis presented, it can be concluded on a reasoned basis, that the W Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities, will not result in adverse effects on the Integrity of the River Shannon SAC, in circumstances where no reasonable scientific doubt remains.

6.8 Evaluation of Adverse Impacts to the Clare Glen SAC

The Screening stage evaluated the potential for Proposed Larger Turbines and Met Masts and the Whole UWF Project to impact the Clare Glen SAC via identified impact pathways (Section 5.5.3). The potential for impacts was identified with regard to individual Qualifying Interests of the SAC. These impacts are evaluated further within this Section 6.8 of this Appropriate Assessment Report 2021, to determine whether the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities, will affect the favourable conservation status of these Qualifying Interests, and thus the overall integrity of the Clare Glen SAC.

The evaluation of the impacts of the Proposed Larger Turbines and Met Masts and the Whole UWF Project on the integrity of the Clare Glen SAC takes account of the following information:

- conservation objectives, outlined at Section 6.8.1 below, for the Qualifying Interests which were screened in for evaluation at Stage 2;
- the potential impact pathways to Qualifying Interests which were screened in for evaluation, these impact pathways are identified in Section 6.8.2;
- The description of the Proposed Larger Turbines and Met Masts and the Whole UWF Project as described in Section 2 of this Appropriate Assessment (AA) Reporting 2021 (Stage 2), and its Mitigation Measures as described in Section 6.5.1 of this report;
- the descriptions of the other unrelated projects and activities as outlined in Section 2.8 of this report.

6.8.1 Conservation Objectives of Clare Glen SAC (000930)

The site-specific conservation objectives of the Clare Glen SAC aims to define favourable conservation condition for the particular habitat or species at that site. These objectives and conditions are summarised in Table 6-22 below *(over)* in respect of the Qualifying Interests of the Clare Glen SAC which were screened in for further evaluation.

The conservation objectives of the Clare Glen SAC are available in full on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites. The conservation objectives outlined in the table below were sourced from *NPWS (2018) Conservation Objectives: Clare Glen SAC 000930. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. [Version dated 16/05/2018]* and should be read in conjunction with any other supporting documentation on the referenced website as referenced above.

Table 6-22: Conservation Objectives of Clare Glen SAC (000930)

Clare Glen SAC (000930)			
Old sessile oak woods with Ilex and Blechnum in the British Isles		**To restore the favourable conservation condition of Old sessile oak woods with Ilex and Blechnum in the British Isles in Clare Glen SAC, which is defined by the following list of attributes and targets:**	
Attribute	**Measure**	**Target**	**Notes**
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The woodland in Clare Glen SAC occurs along the Clare River valley and is of mixed composition with native broadleaves and non-native conifers and beech (Fagus sylvatica). As part of the National Survey of Native Woodlands (NSNW), the sub-site Clare Glen (NSNW site code 1286) was surveyed by Perrin et al. (2008). The minimum area of old oak woodland in the SAC is estimated to be 17.93ha. Map 3 shows the surveyed woodland classified as 91A0 (17.93ha) by Perrin et al. (2008) in the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution based on Perrin et al. (2008)
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring ‘deep’ woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semimature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Sessile oak (Quercus petraea) generally regenerates poorly. In suitable sites, ash (Fraxinus excelsior) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of	Occurrence	No decline	Includes ancient or long-established woodlands (Perrin and Daly, 2010), archaeological and geological features as well as red-data and other rare or localised species. Clare Glen (NSNW site code 1286) has been classified as possible ancient woodland by Perrin

Clare Glen SAC (000930)			
local distinctiveness			and Daly (2010). The Near Threatened liverworts Dumortiera hirsuta and Lejeunea eckloniana (Lockhart et al., 2012) are associated with wet rocks in the river, shaded by the woodland in the SAC (NPWS internal files). The rare Myxomycete fungi Fuligo muscorum, Stemonitopsis hyperopta and Licea testudinacea are present in the woodland and the Annex II listed Killarney fern (Trichomanes speciosum) has also been recorded (NPWS internal files). See also the conservation objective for Killarney fern (1421)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including sessile oak (Quercus petraea) and birch (Betula pubescens)	Species reported in Perrin et al. (2008) and NPWS internal files. See also Young (1971) and Fahy (undated)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common non-native invasive species in this woodland type: beech (Fagus sylvatica), sycamore (Acer pseudoplatanus) and rhododendron (Rhododendron ponticum). Parts of Clare Glen have been planted with conifers (Abies, Picea and Pinus spp.). Beech, rhododendron and cherry laurel (Prunus laurocerasus) also occur in the woodland in the SAC (Perrin et al., 2008; NPWS internal files)
Killarney Fern Trichomanes speciosum (1421)	**To maintain the favourable conservation condition of Killarney Fern in Clare Glen SAC, which is defined by the following list of attributes and targets:**		
Attribute	**Measure**	**Target**	**Notes**
Distribution	Occurrence	No loss in geographical spread of populations, subject to natural processes	The population of Killarney fern (Trichomanes speciosum) is currently known from several locations in Clare Glen SAC, all within hectad R75. Exact locations are not mapped here on account of the threat posed by illegal collecting. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Number of populations	Number	No decline, subject to natural processes	One population of the species has been recorded in the SAC since 1960. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Number of colonies	Number	No decline, subject to natural processes	Eleven colonies of the species have been recorded from the population in the SAC since 1960. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population: lifecycle stage	Type (sporophyte or gametophyte)	Maintain life-cycle stage composition of populations, subject to natural processes	Three of the eleven colonies recorded since 1960 are composed of sporophytes (frond stage), all of which have co-existing gametophytes (filamentous stage), and eight are composed of gametophytes only. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files

Clare Glen SAC (000930)			
Population size: area of occupancy	Square metres	No decline, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population size: living sporophyte fronds	Number	No decline, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: young and unfurling fronds	Occurrence	Young (not fully expanded) and/or unfurling (crozier) fronds present in populations previously observed to have these, subject to natural processes	Young and/or unfurling fronds have been recorded from Clare Glen SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: fertile fronds	Occurrence	Fertile fronds present in populations previously observed to have these, subject to natural processes	Fertile fronds have been recorded from the SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: juvenile sporophyte fronds emerging from gametophytes	Number	No decline, subject to natural processes	Juvenile sporophyte fronds emerging from gametophytes have been recorded from the SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Habitat extent	Hectares	No loss of suitable habitat, subject to natural processes	The species grows in deeply shaded, humid situations - dripping caves, overhangs and crevices on cliffs, rocky slopes, by waterfalls, in stream ravines and gullies, on rock or soil banks in woodlands and, occasionally, under fallen trees and on the floor of damp woodlands. Whilst also occurring in these habitats, the gametophyte stage can grow in drier areas that do not suit the sporophyte. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Hydrological conditions: wet/damp microhabitats	Occurrence	Maintain hydrological conditions at the locations of known populations - visible water source, with dripping or seeping water present and/or substrate wet/damp to touch, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal file
Hydrological conditions: relative humidity	Percentage	Maintain relative humidity levels at known colonies at not less than 80%, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Hydrological conditions: desiccated fronds	Number	No increase, subject to natural processes	Presence of desiccated sporophyte fronds and gametophyte mats is indicative of unsuitable conditions. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Light levels: shading	Shade index score	At least 4 for woodland sporophyte-only and mixed colonies; at least 5 for open	Shade Index: 4. Moderate shade, e.g. light-medium deciduous canopy with sun flecks. 5. Permanently shaded from direct sunlight but otherwise open to sky. 6. Deep woodland (e.g.

Clare Glen SAC (000930)			
		upland sporophyteonly and mixed colonies; at least 6 for gametophyteonly colonies, subject to natural processes	coniferous or in ravine) shade, no sun flecks. 7. Perpetual deep shade, e.g. cave entrance, beneath boulder. The species occurs in moderate to deep shade in woodland in Clare Glen SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Woodland canopy cover	Percentage	No loss of woodland canopy at, or in the vicinity of, the locations of known populations and canopy cover here maintained at more than 33%, subject to natural processes	Woodland management at or near to locations of known populations of the species must take account of its habitat requirements, particularly with regard to maintenance of sufficient canopy cover. The species occurs in woodland in Clare Glen SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Invasive species	Occurrence	Maintain absence of invasive non-native and vigorous native plant species at the locations of known populations or, if present, maintain vegetation cover of these at less than 10%, taking into account the habitat requirements of T. speciosum	In order to avoid negative impacts on the Killarney fern (Trichomanes speciosum), its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.) must be taken into account in locations that are subject to or proposed for management actions to control invasive non-native and/or vigorous native plant species. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files

6.8.2 Qualifying Interests and potential impact pathways which were screened in for evaluation

The Qualifying Interests of Clare Glen SAC and potential impact pathways which were screened in for evaluation are:

Table 6-23: Qualifying Interest Screened In due to potential for the Whole UWF Project to cause effects

Qualifying Interest of Clare Glen SAC Screened In	Impact Pathways Screened in
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Killarney Fern (*Trichomanes speciosum*) [1421]	SAC Pathway 2, 3

The SAC Impacts 2 and 3 are described below:

SAC Pathway 2: Indirect Effects to **QI habitats** of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **within the SAC**

SAC Pathway 3: Indirect Effects to **QI habitats**, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ***ex-situ*** the SAC

6.8.3 Evaluation of the Impact of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts)on Qualifying Interests of the Clare Glen SAC

In order to evaluate the effect of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project on the integrity of the Clare Glen SAC, the impact pathways identified above are examined in detail, through a number of focused impact evaluations, as per:

SAC Impact 2 SAC Impact 3	*Will be examined through these impact evaluations:*	• Decrease in instream aquatic habitat quality • Changes to flow regime • Riparian habitat degradation • Spread of invasive species

For the purposes of the appraisal herein, effects on QI Habitats (and their respective conservation objectives) within the Clare Glen SAC (direct, secondary, within or *Ex-Situ*) as defined via possible pathways SAC Pathway 2 & 3, can be characterised under a number of specific impact types. This includes general decreases in instream aquatic habitat quality, changes to flow regime, degradation of riparian habitat and potential indirect effects via the spread of invasive species.

Timing of Impacts

UWF Grid Connection and associated UWF Other Activities (where they occur within the Killeengarriff catchment) are the only Elements of the Whole UWF Project which have connectivity with the Clare Glen SAC.

The main construction period of UWF Grid Connection will take 12 to 18 months to complete. The projected start date is 2022. Pre-construction activities will be carried out immediately prior to the commencement of the main construction period; these activities will include detailed design, confirmatory surveys, and vegetation clearance (during the appropriate period). The operational phase will commence upon completion of the construction phase. UWF Grid Connection will remain in permanent operation, and will not be decommissioned.

The potential for significant impacts to Clare Glen SAC only relates to the construction stage of UWF Grid Connection. The construction stage was screened in for evaluation as the proposed construction stage works involve the installation of aquatic crossing structures and are taking place in locations with connectivity to the SAC. Potential impacts at this stage include decrease in instream aquatic habitat quality, changes to flow regime, riparian habitat degradation, and spread of invasive aquatic species.

The potential for significant operational stage effects with regard to Clare Glen SAC are screened out as works will be small scale, limited in duration and will take place from hardcore areas.

Evaluation of In-Combination Effects:

The evaluations of the impact of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project *(in particular UWF Grid Connection)* on the Qualifying Interests of the Clare Glen SAC takes into account the in-combination effect of the Whole UWF Project, and the in-combination effect of the Whole UWF Project with the following other unrelated projects and activities:

- Rearcross Quarry
- Castlewaller Windfarm
- Bunkimalta Windfarm
- Agriculture, Forestry and Turf-cutting in the surrounding area.

A description of these unrelated projects and activities is included in Section 2.8 of this report.

The location of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project *(in particular UWF Grid Connection)* in relation to the Clare Glen SAC is illustrated on the following mapping:

AA 2021 Figure 10: Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Clare Glens SAC

6.8.3.1 Evaluation of SAC Impacts 2 & 3

6.8.3.1.1 Effects on QI habitats along Pathways 2 & 3 from decreases in instream aquatic habitat quality, within or ex-situ the Clare Glen SAC

Impact Description:
Project Life Cycle Stage: Construction stage
Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE Whole UWF Project Impact Source: culvert replacement works; parapet works; movement of soils and machinery; excavation works; use of hydrocarbons & cement-based compounds; reinstatement works. Other Unrelated Project/Activity Cumulative Impact Source: Instream works; Movement of soils and machinery; Excavation works; Forestry felling; Hydrocarbons; Reinstatement; Earthworks and Groundwork Impact Pathway: Runoff and surface water, Flowpaths Impact Description: Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Instream works at some watercourses will require direct excavation of the banks and bed of the watercourse, which can change the physical character of the watercourse and has the potential to degrade the quality of the baseline habitat which supports the structure, function and diversity of aquatic dependant species. Water quality effects due to sedimentation: Erosion and deposition are natural process in watercourses[23], varying naturally throughout the year. However, additional sediment contributions entering the watercourse, such as from construction works in, adjacent to or upstream of individual watercourses, can have negative implications. These impacts may be mobilised downstream and affect river reaches at a distance from the physical works. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality. Were the impacts described above to occur within an SAC it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in individuals, colony size or population size – e.g. direct contact with Hydrocarbons may damage Killarney Fern), effects to structure and composition of QI habitat through an altered hydrological regime and through secondary effects such as increased erosion, flooding or altered relative humidity, affect the supporting habitat quality for QI habitats or affect the distinctiveness of habitats within the SAC. In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source pollution type, magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats for downstream but ecologically connected Qualifying Interest (QI) Habitats, thus affecting Site Integrity/Conservation Objectives similarly. Impact Quality: Negative
Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Decreases in Instream Aquatic Habitat Quality
Authorised Upperchurch Windfarm
Impact Magnitude: No works are proposed upstream of Clare Glen SAC. Magnitude is zero. An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Clare Glen SAC.
Significance of the Impact: No adverse effect on European Site Integrity.
Rationale for Impact Evaluation:

[23] EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems,

• Absence of pathways for adverse effects.
Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm
Impact Magnitude: None - absence of connectivity to the Clare Glen SAC
Significance of the Impact: No adverse effects on European Site Integrity
Rationale for Impact Evaluation: • No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment due to an absence of connectivity between the Proposed Amendment/Upperchurch Windfarm and the Clare Glen SAC, and therefore • the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Clare Glen SAC. • the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Clare Glen SAC – i.e. no potential for impact • the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment have no potential to cause adverse effects to the integrity of the Lower River Shannon SAC Qualifying Interests: • No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected. • No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.
Evaluations of the Other Elements of the Whole UWF Project – Decrease in instream aquatic habitat quality
The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019. *Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.*
UWF Related Works (authorised)
Impact Magnitude: No works are authorised upstream of Clare Glen SAC. Magnitude is zero.
Significance of the Impact: No adverse effect on European Site Integrity.
Rationale for Impact Evaluation: • Absence of pathways for adverse effects.
UWF Grid Connection (authorised)
Impact Magnitude: Of the 68 No. watercourse crossings required for the UWF Grid Connection, 29 no. (W11-W39 inclusive) are located upstream or are hydrologically connected to the downstream Clare Glen SAC. No watercourse crossing locations are within the SAC boundary, therefore there is no potential for direct effects. Apart from a larger crossing of the River Clare itself at Watercourse W36, the 29 no. watercourse crossing locations are all minor streams, drains or first order tributaries of the Clare (Annagh) River, along the regional R503 road. At watercourse W36, which is a bridge structure on the Clare River, works will be limited to the road surface with the cable installed in the structure, road level increased, and the parapet walls at this location will be raised (with all works taking place from the road surface over the bridge structure).

The remaining crossing points are all over or under existing culverts or bridges on the R503 Regional Road. Due to the nature of some of the culverts (being old masonry box culverts), there is potential that the existing culverts may need to be replaced at 8 no. Watercourses Crossings (W13, W14, W15, W17, W19, W20, W32, & W34).

The potential for decreases in aquatic habitat quality likely to affect the downstream Clare Glen SAC relates to sources (excavation works for cable trenches and joint bays, culvert replacement works, parapet works) of additional sedimentation or contamination by fuels, oils or cement at works locations in close proximity to the 29 No. watercourses, with risk increased at 9 no. watercourse subject to parapet wall works (W36) or potential culvert replacement. Sequential or cumulative effects may occur dependant on how many watercourse crossings are being worked on simultaneously. Effects to surface water quality, can then indirectly affect aquatic habitat quality. Only between 100 – 300m of the trench will be excavated in any day with a maximum of 3 watercourse crossings being completed in any one day (assumed 3 work crews on the R503).

As part of Project Design, 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 (GC-PD29, see Section 6.5.1); all culvert works will be subject to the implementation of water quality protection measures GC-PD11-GC-PD45 and will be supervised by a member of CIEEM and the Institute of Fisheries Management (GC-PD41). A Surface Water Management Plan will be implemented during works. In addition all works will be carried out in line with Best Practice (IFI, 2016 as per GC-PD49) and culvert replacement works will not take place without the isolation of flow within the respective watercourse (GC-PD50). Finally, all works to bridge parapet walls will only be undertaken with the use of debris netting, affixed to the outside of walls to prevent debris falling into the river (GC-PD31).

Given this the magnitude of any effect is evaluated as negligible.

Significance of the Impact: No adverse effects on the Integrity of the Clare Glen SAC

Rationale for Impact Evaluation:

- 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 (Project Design Measure), which puts works outside of key sensitivity periods for the aquatic receptors. Flow conditions during this period are also likely to be lower, with lower relative contributions from surface water run-off;
- The in-stream works will not be undertaken without isolation of flow within the watercourse, prior to the in-stream works commencing (Project Design Measure);
- Implementation of the Project Design Measures for Water Quality protection (GC-PD11 to GC-PD45) through the Surface Water Management Plan for UWF Grid Connection
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design);
- The spatial extent of effects to the watercourse channel will occur within the footprint of any works at potential culvert replacement locations;
- The frequency of such an event is once for any culvert replacement works;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat.
- all works to bridge parapet walls will only be undertaken with the use of debris netting, affixed to the outside of walls to prevent debris falling into the river;
- The dilution factor of the main channel of the Clare River will avoid any alteration to hydrology;
- Impacts to the watercourse channel are temporary and reversible. The duration of any reductions in the quality of downstream habitats due to siltation or the introduction of pollutants are considered with regard to Clare Glen Qualifying Interests; such effects are evaluated to be temporary to short-term and reversible; and
- It's likely only between 100 – 300m of the trench will be excavated in any day with only 1 – 3 watercourse crossings being completed in any one day (assumed 3 work crews). Therefore, taking account of the temporary nature of the works within the catchment, all effects will be brief to temporary in nature and reversible.

UWF Replacement Forestry (licensed)

Impact Magnitude:

No works are authorised upstream of Clare Glen SAC. Magnitude is zero.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:
- Absence of pathways for adverse effects.

UWF Other Activities

The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. No works occur in close proximity to Clare Glen SAC. Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:
- Absence of pathways for adverse effects.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Decrease in instream aquatic habitat quality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Clare Glen SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude:

Whole UWF Project effects are in the order of the UWF Grid connection impact described above. Negligible magnitude in line with the evaluation for the UWF Grid Connection element alone.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):
No adverse effects on the Integrity of the Clare Glen SAC

Rationale for Impact Evaluation:
- 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 (Project Design Measure), which puts works outside of key sensitivity periods for the aquatic receptors. Flow conditions during this period are also likely to be lower, with lower relative contributions from surface water run-off;
- The in-stream works will not be undertaken without isolation of flow within the watercourse, prior to the in-stream works commencing (Project Design Measure);
- Implementation of the Project Design Measures for Water Quality protection (GC-PD11 to GC-PD45) through the Surface Water Management Plan for UWF Grid Connection
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design);
- The spatial extent of effects to the watercourse channel will occur within the footprint of any works at potential culvert replacement locations;
- The frequency of such an event is once for any culvert replacement works;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat.
- all works to bridge parapet walls will only be undertaken with the use of debris netting, affixed to the outside of walls to prevent debris falling into the river;
- The dilution factor of the main channel of the Clare River will avoid any alteration to hydrology;
- Impacts to the watercourse channel are temporary and reversible. The duration of any reductions in the quality of downstream habitats due to siltation or the introduction of pollutants are considered with regard to Clare Glen Qualifying Interests; such effects are evaluated to be temporary to short-term and reversible; and
- It's likely only between 100 – 300m of the trench will be excavated in any day with only 1 – 3 watercourse crossings being completed in any one day (assumed 3 work crews). Therefore, taking account of the temporary nature of the works within the catchment, all effects will be brief to temporary in nature and reversible.

Qualifying Interests:
- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Decrease in instream aquatic habitat quality

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Clare Glen SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:

Whole UWF Project effects in combination with other projects and activities are in the order of the UWF Grid connection in-combination effects, described above. Overall cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: No adverse effect on the Integrity of the Clare Glen SAC

Rationale for Cumulative Impact Evaluation:

- In-stream works or culvert replacement works in watercourses upstream of Clare Glen SAC for UWF Grid Connection only relate to the construction works on the Regional Road R503 in the Killeengarrif_SC_010 sub-catchment and 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 (Project Design Measure);
- Application of comprehensive water quality protection measures for UWF Grid Connection through the UWF Grid Connection Environmental Management Plan (2019) with supervision by supervised by a member of CIEEM and the Institute of Fisheries Management during all instream works and culvert replacement works (i.e. whether fisheries value or not);
- The duration of any reductions in the quality of downstream habitats due to siltation or the introduction of pollutants are considered with regard to Clare Glen Qualifying Interests; such effects are evaluated to be temporary to short-term and reversible.

Other Projects

- the location of Castlewaller Windfarm and the potential Bunkimalta Windfarm predominately in other subcatchments with no pathways to the SAC,
- the small scale of potential works for Castlewaller Windfarm upstream of the SAC, and the large separation distance to any potential Bunkimalta Windfarm works; and the large upstream distance to Rearcross quarry.
- No contrast to existing baseline conditions or material changes is expected in respect of Forestry, Agriculture and Turfcutting;
- A Sediment Control Plan is expected to form part of any future proposed Bunkimalta Windfarm project.

6.8.3.1.2 Effects on QI habitats along Pathways 2 & 3 from changes to flow regime within or ex-situ the Clare Glen SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: culvert replacement works; movement of soils and machinery; excavation works;
Other Unrelated Project/Activity Cumulative Impact Source: Instream works; new crossing structures;
Impact Pathway: surface water flowpaths;
Impact Description: Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. Any change in watercourse morphology which affects channel flow regimes can result in cross factor effects on aquatic ecological communities.

The creation of adverse flow conditions or habitat limitations due to changes to flow or morphology will be limited to the specific works period within or adjacent to the aquatic habitat.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and /or species and Conservation objectives such as distribution or extent of QI habitat (including a reduction in size), effects to structure and vegetation composition of QI habitat, or an altered hydrological regime, which may alter the supporting habitat quality for QI Species (e.g. Killarney Fern), or affect the distinctiveness of habitats within the SAC.
In instances where this impact occurs outside or ex-situ the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats and/or species for downstream but ecologically connected Qualifying Interest (QI) Habitats and or/species, thus affecting Site Integrity/Conservation Objectives similarly.

Works within the catchment of the Clare Glen SAC are limited to UWF Grid Connection.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Changes to Flow Regime

Authorised Upperchurch Windfarm

Impact Magnitude:
No works are proposed upstream of Clare Glen SAC. Magnitude is zero.
An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Clare Glen SAC.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:
- Absence of pathways for adverse effects.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None - absence of connectivity to the Clare Glen SAC

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:
- No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment due to an absence of connectivity between the Proposed Amendment/Upperchurch Windfarm and the Clare Glen SAC, and therefore
- the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Clare Glen SAC.

- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Clare Glen SAC – i.e. no potential for impact
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment have no potential to cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Evaluations of the Other Elements of the Whole UWF Project - Changes to Flow Regime

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019. Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:

No works are authorised upstream of Clare Glen SAC. Magnitude is zero.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

UWF Grid Connection (authorised)

Impact Magnitude:

Of the 68 No. watercourse crossings required for the UWF Grid Connection, 29 no. (W11-W39 inclusive) are located upstream or are hydrologically connected to the downstream Clare Glen SAC. No watercourse crossing locations are within the SAC boundary, therefore there is no potential for direct effects.

Apart from a larger crossing of the River Clare itself at Watercourse W36, the 29 no. watercourse crossing locations are all minor streams, drains or first order tributaries of the Clare (Annagh) River, along the regional R503 road. At watercourse W36, which is a bridge structure on the Clare River, works will be limited to the road surface with the cable installed in the structure, road level increased, and the parapet walls at this location will be raised (with works taking place from the road surface over the bridge structure).

The remaining crossing points are all over or under existing culverts or bridges on the R503 Regional Road. Due to the nature of some of the culverts (being old masonry box culverts), there is potential that the existing culverts may need to be replaced at 8 no. Watercourses Crossings (W13, W14, W15, W17, W19, W20, W32, & W34).

The potential for altered flow regime likely to affect the downstream Clare Glen SAC relates to sources (excavation works for cable trenches and joint bays, culvert replacement works, parapet works) of additional sedimentation at works locations in close proximity to the 29 No. watercourses, with increased risk at 9 no. watercourse subject to parapet wall works (W36) or potential culvert replacement (W13, W14, W15, W17, W19, W20, W32, & W34). Sequential or cumulative effects may occur dependant on how many watercourse crossings are being worked on simultaneously. It's likely only between 100 – 300m of the trench will be excavated in any day with only 1 – 3 watercourse crossings being completed in any one day (assumed 3 work crews).

At the 8 no. locations of potential culvert replacement works, changes to the flow regime will be brief (1 day) and for the duration of the immediate works, restricted to the location of the works area within the footprint of, or directly adjacent to the existing crossing point in the public road. Changes to the flow regime at these crossing locations will be avoided through the carrying out of works during dry weather in dryer months of the year, the isolation of flow and equilibrated restoration, over pumping of the water from upstream to downstream of works, the use of deflector

plates, the equilibrated restoration of flow and the sensitive restoration of the bed and banks of these watercourse following works (Project Design). The magnitude of impact is negligible to low, and the duration is long-term and permanent, taking account of Project Design.
At the remaining watercourses upstream of Clare Glen SAC, cables will be installed either under or over the structure. Any changes to flow regime due to sedimentation will be negligible with the implementation of Project Design Measures, such as the use of sandbags to avoid the runoff of sediment laden water from construction works areas, the treatment of any water pumped from excavations prior to discharge, and the carrying out of construction works at and in close proximity to Class 1 or Class 2 watercourses during dry periods. All works to bridge parapet walls will only be undertaken with the use of debris netting, affixed to the outside of walls to prevent debris falling into the river (GC-PD31).
Magnitude evaluated as Negligible.

Significance of the Impact: No adverse effects on the Integrity of the Clare Glen SAC

Rationale for Impact Evaluation:

- 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.
- Most watercourses are characterized as small, first order streams, which have all been in some way altered by the existing landuse (i.e. agriculture or public road infrastructure);
- The limited extent of direct instream works potentially affecting flow, and the sensitive design of replaced crossing structures following from pre-planning consultation with IFI.
- The brief to temporary duration and reversibility of any effects.
- the implementation of comprehensive water quality Project Design protection measures which will minimize/avoid sediment laden runoff from entering watercourses.

UWF Replacement Forestry (licensed)

Impact Magnitude:
UWF Relacement Forestry is not hydrologically connected tothe Clare Glen SAC. Magnitude is zero.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

UWF Other Activities

The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. No works occur in close proximity to Clare Glen SAC. Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Changes to Flow Regime

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Clare Glen SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: Whole UWF Project effects are in the order of the UWF Grid connection impact described above. Negligible magnitude in line with the evaluation for the UWF Grid Connection element alone.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Clare Glen SAC

Rationale for Cumulative Impact Evaluation:

- 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.
- Most watercourses are characterized as small, first order streams, which have all been in some way altered by the existing landuse (i.e. agriculture or public road infrastructure);
- The limited extent of direct instream works potentially affecting flow, and the sensitive design of replaced crossing structures following from pre-planning consultation with IFI.
- The brief to temporary duration and reversibility of any effects.
- the implementation of comprehensive water quality Project Design protection measures which will minimize/avoid sediment laden runoff from entering watercourses;

Qualifying Interests:

- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Changes to Flow Regime

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Clare Glen SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: Whole UWF Project effects in combination with other projects and activities are in the order of the UWF Grid connection in-combination effects, described above. Overall cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Clare Glen SAC**

Rationale for Cumulative Impact Evaluation:

- The other project elements are not located upstream of Clare Glen SAC;
- The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);
- The limited extent of direct instream works (culvert replacement works) potentially affecting flow;
- The sensitive crossing designs to be implemented (Project Design);
- The brief to temporary duration and reversibility of any effects;

Other Projects or Activities

- the location of Castlewaller Windfarm and the potential Bunkimalta Windfarm predominately in other subcatchments with no pathways to the SAC,
- the small scale of potential works for Castlewaller Windfarm upstream of the SAC, and the large separation distance to any potential Bunkimalta Windfarm works; and the large upstream distance to Rearcross quarry.
- No contrast to existing baseline conditions or material changes is expected in respect of Forestry, Agriculture and Turfcutting.

6.8.3.1.3 Effects on QI habitats along Pathways 2 & 3 from Riparian habitat degradation within or ex-situ the Clare Glen SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: culvert replacement works; movement of soils and machinery; excavation works; reinstatement works

Other Unrelated Project/Activity Cumulative Impact Source: Instream works; Movement of soils and machinery; Excavation works; Forestry felling; Reinstatement

Impact Pathway: Soils; Direct contact

Impact Description: The riparian corridor along a watercourse relates to the interface between the aquatic habitat, the bankside vegetation and terrestrial environment. An intact, semi-natural riparian zone has significant beneficial services in the protection of instream aquatic habitat quality, food/nutrient contributions, and temperature regulation. Existing riparian habitat quality within the study area is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.

The removal of, or damage to, riparian vegetation during instream works or excavation/ground clearance works in close proximity to any watercourse has the potential to impact on the quality of riparian habitats which in turn can affect watercourse morphology, shading, bank stability, and nutrient and sediment loading and result in indirect effects on aquatic species.

The magnitude of resultant effects is expected to be higher when this occurs within an SAC as to without, given that effects are naturally localised. However downstream effects may occur to European Sites where suitable connectivity exists especially if riparian habitat degradation ex-situ leads to increased downstream sediment loads, resulting in downstream changes to the hydrological regime of European Sites, potential changes in water levels, erosion levels or other habitat requirements.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, an altered hydrological regime and, or affect the distinctiveness of habitats within the SAC.

In instances where this impact occurs outside or ex-situ the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats for downstream but ecologically connected Qualifying Interest (QI) Habitats, thus affecting Site Integrity/Conservation Objectives similarly.

Works within the catchment of the Clare Glen SAC are limited to UWF Grid Connection.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Riparian Habitat Degradation

Authorised Upperchurch Windfarm

Impact Magnitude:

No works are proposed upstream of Clare Glen SAC. Magnitude is zero.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Clare Glen SAC.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None - absence of connectivity to the Clare Glen SAC

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment due to an absence of connectivity between the Proposed Amendment/Upperchurch Windfarm and the Clare Glen SAC, and therefore
- the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Clare Glen SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Clare Glen SAC – i.e. no potential for impact
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment have no potential to cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Evaluations of the Other Elements of the Whole UWF Project - Riparian habitat degradation

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
No works are authorised upstream of Clare Glen SAC. No hydrological connectivity. Magnitude is zero.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

UWF Grid Connection (authorised)

Impact Magnitude:
Of the 68 No. watercourse crossings required for the UWF Grid Connection, 29 no. (W11-W39 inclusive) are located upstream or are hydrologically connected to the downstream Clare Glen SAC. No watercourse crossing locations are within the SAC boundary, therefore there is no potential for direct effects.
Apart from a larger crossing of the River Clare itself at Watercourse W36, the 29 no. watercourse crossing locations are all minor streams, drains or first order tributaries of the Clare (Annagh) River, along the regional R503 road. At watercourse W36, which is a bridge structure on the Clare River, works will be limited to the road surface with the cable installed in the structure, road level increased, and the parapet walls at this location will be raised (with works taking place from the road surface over the bridge structure).
The remaining crossing points are all over or under existing culverts or bridges on the R503 Regional Road. Due to the nature of some of the culverts (being old masonry box culverts), there is potential that The existing culverts may need to be replaced at 8 no. Watercourses Crossings (W13, W14, W15, W17, W19, W20, W32, & W34).
The potential for riparian habitat degradation likely to affect the downstream Clare Glen SAC relates to culvert replacement works along the R503 at 8 No. watercourse crossing locations; W13, W14, W15, W17, W19, W20, W32, & W34.

Riparian habitat impacts will be reversible with reinstatement and will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established. The impact magnitude is Low.

Significance of the Impact: No adverse effects on the Integrity of the Clare Glen SAC

Rationale for Impact Evaluation:

- Riparian habitat impacts are limited due to the 110kV UGC located within an existing public road and involving already in situ culverts;
- The general context of the locations of potential culvert replacements comprising mainly minor drains and watercourses;
- Minor clearance of riparian vegetation within the footprint of the potential culvert replacements will be required;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions and reversible with reinstatement.
- supervision of all culvert replacement works (W14 and 7 no. other locations at watercourses with sub-optimal or no fisheries value) by a member of CIEEM and the Institute of Fisheries Management.

UWF Replacement Forestry (licensed)

Impact Magnitude:
No works are authorised upstream of Clare Glen SAC. No hydrological connectivity. Magnitude is zero.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

UWF Other Activities

The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. No activities occur in close proximity to Clare Glen SAC.
Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Riparian habitat degradation

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Clare Glen SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude Whole UWF Project effects are in the order of the UWF Grid connection impact described above. Negligible magnitude in line with the evaluation for the Grid Connection element alone.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Clare Glen SAC

Rationale for Cumulative Impact Evaluation:

- Riparian habitat impacts are limited due to the 110kV UGC located within an existing public road and involving already in situ culverts;
- The general context of the locations of potential culvert replacements comprising mainly minor drains and watercourses;
- Minor clearance of riparian vegetation within the footprint of the potential culvert replacements will be required;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions and reversible with reinstatement.
- supervision of all culvert replacement works (W14 and 7 no. other locations at watercourses with sub-optimal or no fisheries value) by a member of CIEEM and the Institute of Fisheries Management

- No overlap between UWF Grid Connection and Upperchurch Widnfarm UWF Related Works or UWF Replacement Forestry as these Other Elements are not hydrologically connected to the Clare Glen SAC.

Qualifying Interests:

- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Riparian habitat degradation

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Clare Glen SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: Whole UWF Project effects in combination with other projects and activities are in the order of the UWF Grid connection in-combination effects, described above. Overall cumulative magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Clare Glen SAC**

Rationale for Cumulative Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations,
- Separation distance to upstream in combination Other Projects and consented measures to be implemented as part of those projects;
- The localized nature of any effects, upstream from and outside the SAC.

6.8.3.1.4 Effects on QI habitats along Pathways 2 & 3 from the Spread of Invasive Species within or ex-situ Clare Glen SAC

Impact Description

Project Life Cycle Stage: Construction stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: culvert replacement works; excavation works, movement of soils and machinery; Other Unrelated Project/Activity Cumulative Impact Source: Instream works; Excavation works, movement of soils and machinery

Impact Pathway: Surface water; Movement of soils and machinery

Impact Description: Invasive aquatic species include non-native, terrestrial invasive species such as Japanese knotweed or Himalayan balsam, invasive riparian vegetation (such as Japanese knotweed) and.

The spread of invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream (mobile species and 3rd party transport) and downstream (hydrological transport) within a watercourse, potentially extending throughout the catchment.

Non-native, invasive species potentially affecting the aquatic environment can also include terrestrial species which compromise bank integrity, riparian structural diversity and riparian invertebrate production contributing to habitat diversity and feeding inputs within the aquatic system.

Were the impacts described above to occur within an SAC watercourse it may result in direct adverse effects on QI habitats and Conservation objectives such as distribution and extent of QI habitat (including a reduction in size), effects to structure and composition of QI habitat, an altered hydrological regime and through secondary effects on QI species, reduce the distinctiveness of the SAC. Invasive species and the spread thereof within Clare Glen SAC could result in a decline in Killarney Fern through a) increased competition and b) in some instances where woodland management recommends the removal of invasive species (once established), this very removal can alter environmental conditions around light, humidity and temperature.

In instances where this impact occurs outside or *ex-situ* the SAC it may, dependant on source magnitude, degree of hydrological connectivity and presence or absence of mitigating measures in line with tried and tested methods, have secondary adverse effects on supporting habitats for downstream but ecologically connected Qualifying Interest (QI) Habitats, thus affecting Site Integrity/Conservation Objectives similarly.

The management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plan which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Spread of Invasive Species

Authorised Upperchurch Windfarm

Impact Magnitude:

No works will take place upstream of Clare Glen SAC. No hydrological connectivity and no haulage routes in close proximity to watercourses hydrologically upstream. Magnitude is zero.

An amendment to the Upperchurch Windfarm substation was authorised in December 2020. The amended substation location is not hydrologically connected with the Clare Glen SAC.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None - absence of connectivity to the Clare Glen SAC

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment due to an absence of connectivity between the Proposed Amendment/Upperchurch Windfarm and the Clare Glen SAC, and therefore
- the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Clare Glen SAC.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Clare Glen SAC – i.e. no potential for impact
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment have no potential to cause adverse effects to the integrity of the Lower River Shannon SAC

Qualifying Interests:

- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Evaluations of the Other Elements of the Whole UWF Project - Spread of Invasive Species

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019. Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:

No works are authorised upstream of Clare Glen SAC. No hydrological connectivity and no haulage routes in close proximity to watercourses hydrologically upstream. Magnitude is zero.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

UWF Grid Connection (authorised)

Impact Magnitude:

There is potential for the introduction of non-native invasive species at all 29 no. (W11-W39 inclusive) watercourse crossings which are located upstream or are hydrologically connected to the downstream Clare Glen SAC. No watercourse crossing locations are within the SAC boundary, therefore there is no potential for direct effects.

Apart from a larger crossing of the River Clare itself at Watercourse W36, the 29 no. watercourse crossing locations are all minor streams, drains or first order tributaries of the Clare (Annagh) River, along the regional R503 road. At watercourse W36, which is a bridge structure on the Clare River, works will be limited to the road surface with the cable installed in the structure, road level increased, and the parapet walls at this location will be raised (with works taking place from the road surface over the bridge structure). – no instream works are required.

The remaining crossing points are all over or under existing culverts or bridges on the R503 Regional Road. Due to the nature of some of the culverts (being old masonry box culverts), there is potential that the existing culverts may need to be replaced at 8 no. Watercourses Crossings (W13, W14, W15, W17, W19, W20, W32, & W34).

The potential for the spread of invasive species likely to affect the downstream Clare Glen SAC relates to all crossing works (cable trench) at 29 no. crossings with likelihood increased at 8 no. in the event culvert replacement is required, and due to the movement of machinery over watercourses at existing road crossings; these include the transport, spread or introduction of terrestrial invasive species such as Japanese knotweed or Himalayan balsam, where these

species occur widely within the study area. The potential for introduction of invasive riparian vegetation (such as Japanese knotweed), is limited to the culvert replacement locations along the route of the 110kV UGC upstream of Clare Glen (n=8), where works may interact with the aquatic environment to facilitate introduction or spread of invasive species.

Sequential or cumulative effects may occur dependant on how many watercourse crossings are being worked on simultaneously. It's likely only between 100 – 300m of the trench will be excavated in any day with only 1 – 3 watercourse crossings being completed in any one day (assumed 3 work crews).

However, all watercourse crossing locations are located outside and upstream of the SAC boundary and the management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plan which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided.

On this basis magnitude is evaluated as negligible.

Significance of the Impact: No adverse effects on the Integrity of the Clare Glen SAC

Rationale for Impact Evaluation:

- The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, spread of invasive species is evaluated as non-reversible; however
- the implementation of the Invasive Species Management Plan and adherence to best practice Biosecurity Protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring.

UWF Replacement Forestry (licensed)

Impact Magnitude:

No works are authorised upstream of Clare Glen SAC. No connectivity. Magnitude is zero.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

UWF Other Activities

The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. No works occur in close proximity to Clare Glen SAC.

Overall magnitude is evaluated as negligible.

Significance of the Impact: No adverse effect on European Site Integrity.

Rationale for Impact Evaluation:

- Absence of pathways for adverse effects.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Spread of Invasive Species

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the Clare Glen SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude: Evaluated as in the order of the UWF Grid Connection element only i.e. there is potential for the introduction of non-native invasive species at all 29 no. (W11-W39 inclusive) watercourse crossings which are located upstream and are hydrologically connected to the downstream Clare Glen SAC. No watercourse crossing locations are within the SAC boundary, therefore there is no potential for direct effects. The other elements of the Whole UWF Project are not hydrologically connected and do no involve works or haulage in close proximity to watercourses hydrologically upstream of Clare Glen SAC.

However all watercourse crossing locations are located outside and upstream of the SAC boundary and the management of non-native, invasive species will be subject to a bespoke Invasive Species Management Plans for UWF

Grid Connection which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided.
Impact Magnitude is negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):
No adverse effects on the Integrity of the Clare Glen SAC

Rationale for Cumulative Impact Evaluation:

- The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, spread of invasive species is evaluated as non-reversible; however
- the implementation of the Invasive Species Management Plan and adherence to best practice Biosecurity Protocols (IFI, 2010) will ensure that there is no likelihood of this effect occurring.

Qualifying Interests:

- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities
– Spread of Invasive Species

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the Clare Glen SAC - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (*reproduced hereunder*):

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at 29 No. watercourse crossing works locations, associated with the Whole UWF Project, and which are outside but hydrologically upstream of Clare Glen SAC.

Although the presence of invasive species throughout the study area, established as the baseline condition and thus contributing to the risk of spread where infestations from one location to another is noted, cognisance is also given to the management of non-native, invasive species through the bespoke Invasive Species Management Plan for UWF Grid Connection which includes Best Practice biosecurity measures and supervison by an invasive species specialist, this will ensure that the spread of invasive species is avoided.

With regard to Other Projects, it is considered that while Castlewaller Windfarm and the potential Bunkimalta Windfarm both have potential to spread invasive species, that it is not likely to occur due to the expected implementation and adherence to Best Practice in the eradication and treatment of invasive species to ensure compliance with legislative requirements. It is also assumed that these other projects will include best practice control measures to prevent the spread of invasive species, to meet regulatory requirements.

The cumulative Impact magnitude is negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities: **No adverse effect on the Integrity of the Clare Glen SAC**

Rationale for Cumulative Impact Evaluation:

- The spread of invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of invasive species is evaluated as non-reversible.
- The location of the UWF Grid Connection, upstream of Clare Glen, predominately in a separate catchment to the Other Elements of the Whole UWF Project;
- The implementation of the Invasive Species Management Plan for UWF Grid Connection will avoid the UWF Grid Connection contributing to any effects from Other Elements or Other Projects.

Other Projects & Activities

- The construction of the consented Bunkimalta wind farm and its associated elements, will be obliged to meet its statutory requirements with regard to the introduction or spread of invasive species as set out in the birds and habitats regulations- with specific reference to species listed in Annex III of those regulations.
- The construction of the consented Castlewaller wind farm, will be obliged to meet the requirements set out in the Ecological Management Plan, in addition to its statutory requirements with regard to the introduction or spread of invasive species as set out in the birds and habitats regulations- with specific reference to species listed in Annex III of those regulations.
- it is assumed that the Castlewaller grid connection element (which may be proposed at a future date), will include best practice control measures to prevent the spread of invasive species, to meet regulatory requirements.
- No material changes in agricultural/forestry/turf-cutting practices are expected or planned in the area

6.8.4 Summary of the Impact of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts Amendment) on Qualifying Interests of Clare Glen SAC

This section *(Section 6.8)* of the NIS has provided further evaluation of the source-impact pathways identified at Stage 1 Screening as having the potential to result in likely significant effects on the Clare Glen SAC and its respective Qualifying Interests screened in for further appraisal.

The Qualifying Interests screened in for evaluation at Stage 2 were:

Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Killarney Fern (*Trichomanes speciosum*) [1421]	SAC Pathway 2, 3

The above Qualifying Interests habitats have been subject to further examination in respect of their specific sensitivities & Conservation Objectives as to whether the identified pathways/effects can be considered likely to result in adverse effects on European Site Integrity via effects on Conservation Objectives; this has concluded that:

- No effects on QI Habitat Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] via reductions in habitat area, distribution or size, woodland structure, or vegetation composition are expected.
- No effects on QI Killarney Fern (Trichomanes speciosum) [1421] via reductions in or alterations to its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.), or the introduction of Invasive Species, as defined in CO targets are expected.

Cognisance has been given at this stage to the various Mitigation Measures (see Section 6.5.1) designed to specifically avoid adverse effects on European Site Integrity, and to in-combination effects with both other project elements of the Whole Upperchurch Windfarm Project in addition to other plans, projects or activities, or consented projects within the defined temporal and spatial overlap for cumulative or in combination effects. Effects both within and without (i.e. ex-situ) the Clare Glen SAC have been considered.

Table 6-24, overleaf in Section 6.8.5 summarises the evaluation of the impact of the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities on the Integrity of the Clare Glen SAC.

6.8.5 Evaluation of the impact of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) on the Integrity of the Clare Glen SAC

Using the checklist in the Table below, the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities is examined, for adverse impacts on the integrity of the Clare Glen SAC.

Table 6-24: Integrity of Site checklist

Does the project or plan have the potential to:	**Yes/No**
- cause delays in progress towards achieving the conservation objectives of the site?	No
- interrupt progress towards achieving the conservation objectives of the site?	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No
- change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No
- reduce the area of key habitats?	No
- reduce the population of key species?	No
- change the balance between key species?	No
- reduce diversity of the site?	No
- result in disturbance that could affect population size or density or the balance between key species?	No

The evaluation herein has found, that following the examination and analysis presented, it can be concluded on a reasoned basis, that the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities will not result in adverse effects on the Integrity of Clare Glen SAC, in circumstances where no reasonable scientific doubt remains.

It is also noted that the locations of the Proposed Larger Turbines and Met Masts have no hydrological or physical connectivity to the Clare Glen SAC.

6.9 Evaluation of Adverse Impacts to the Slievefelim to Silvermines Mountain SPA

The Screening stage evaluated the potential for the Proposed Larger Turbines and Met Masts and the Whole UWF Project to impact the Slievefelim to Silvermines Mountain SPA via identified impact pathways (Section 5.5.4). The potential for impacts was identified with regard to the Special Conservation Interest of the SPA – Hen Harrier. These impacts are evaluated further within this Section 6.9 of this Appropriate Assessment Report 2021, to determine whether the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities, will affect the favourable conservation status of the special conservation interest, and thus the overall integrity of the Slievefelim to Silvermines Mountain SPA.

The evaluation of the impacts of the Proposed Larger Turbines and Met Masts and the Whole UWF Project on the integrity of the Slievefelim to Silvermines Mountain SPA takes account of the following information:

- conservation objectives, outlined at Section 6.9.1 below, for the Special Conservation Interest of the Slievefelim to Silvermines Mountain SPA which was screened in for evaluation at Stage 2;
- the potential impact pathways to the Special Conservation Interest which was screened in for evaluation, these impact pathways are identified in Section 6.9.2;
- The description of the Proposed Larger Turbines and Met Masts and the Whole UWF Project as described in Section 2 of this Appropriate Assessment (AA) Reporting 2021 (Stage 2), and its Mitigation Measures as described in Section 6.5.2 of this report;
- the descriptions of the other unrelated projects and activities as outlined in Section 2.8 of this report.

6.9.1 Conservation Objectives of the Slievefelim to Silvermines Mountain SPA (004165)

The conservation objectives of the Slievefelim to Silvermines Mountains SPA are provided in Table 6-25 below, and are available on the National Parks & Wildlife Service website at https://www.npws.ie/protected-sites. The conservation objectives outlined in the table below were sourced from NPWS *Conservation objectives for Slievefelim to Silvermines Mountains SPA [004165]. Generic Version 6.0*. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. [Version dated 21/02/2018]]

Table 6-25: Conservation Objectives of Slievefelim to Silvermines Mountains SPA (004165)

Slievefelim to Silvermines Mountains SPA (004165)			
Hen Harrier (*Circus cyaneus*)	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA**:**		
	Bird Code A082	Common Name Hen Harrier	Scientific Name *Circus cyaneus*

6.9.2 Special Conservation Interest of the Slievefelim to Silvermines Mountain SPA and potential impact pathways which were screened in for evaluation

The Special Conservation Interest and potential impact pathways which were screened in for evaluation are:

Table 6-26: Special Conservation Interest Screened In due to potential for the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) to cause effects

Special Conservation Interest Screened In	Impact Pathways Screened in
Hen Harrier [A082]	SPA Pathway 1, 2, 3, 4

The SPA Pathways 1 to 3 are described below:

SPA Pathway 1: Direct disturbance or mortality effects to **SCI species within an SPA**

SPA Pathway 2: Indirect effects to **SCI species within an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species)

SPA Pathway 3: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, or through a reductions in prey item species outside their respective SPA.

SPA Pathway 4: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. disturbance or mortality effects to SCI species outside their respective SPA).

6.9.3 Evaluation of the Impact of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts) on the Special Conservation Interest of the Slievefelim to Silvermines Mountain SPA

In order to evaluate the effect of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project on the integrity of the Slievefelim to Silvermines Mountain SPA, the impact pathways identified above are examined in detail, through a number of focused impact evaluations, as per:

SPA Pathway 2 SPA Pathway 3	*Will be examined through these impact evaluations:*	• Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat • Reduction in Prey Item Species
SPA Pathway 1 SPA Pathway 4		• Disturbance/Displacement of foraging Hen Harrier, during the breeding season • Disturbance/Displacement of foraging Hen Harrier outside the breeding season • Collison risk with operating turbines

The Conservation Objective for the Slievefelim to Silvermines Mountains SPA is (taken from NPWS, 2018):

"to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:'

The *favourable conservation status of a species* is achieved when (taken from NPWS, 2018):

- *Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats and*
- *The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and*
- *There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.*

On the basis of the above, the identified pathways are evaluated as sufficient to inform a considered and reasoned examination and analysis of habitat effects (such as whether sufficient habitat will continue to be available, and/or the range of the species is not being reduced or is likely to be reduced in the foreseeable future within the SPA under consideration) as a result of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts); direct or indirect effects through displacement or exclusion (another form of habitat loss or possible range reduction) either in the breeding season[24] or winter season, or through direct and secondary effects on individuals such as disturbance, mortality and/or loss of prey items and the subsequent effects on population dynamics within or *ex-situ* the SPA (i.e. maintenance as a favourable reference population following possible effects on breeding success and/or annual breeding productivity within the SPA, the continuing viability of the SPA population).

Timing of Impacts

[24] We note that the Site Synopsis for the SPA cites that it is of '*ornithological importance because it provides excellent nesting and foraging habitat for breeding Hen Harrier* (emphasis added) *and is one of the top sites in the country for the species'* – Examination and analysis is also presented herein in respect of possible effects on Hen Harrier outside the breeding season, for completeness and in line with a precautionary principle.

The main construction period will take 12 to 18 months to complete. The projected start date is 2022. Pre-construction activities will be carried out immediately prior to the commencement of the main construction period; these activities will include detailed design, confirmatory surveys, and vegetation clearance (during the appropriate period). The operational phase will commence upon completion of the construction phase. According to the conditions of planning permission for the Upperchurch Windfarm element '*the permission shall be for a period of 25 years from the date of the commissioning of the wind turbines. The wind turbines and related ancillary structures shall then be decommissioned and removed unless, prior to the end of the period, planning permission shall have been granted for their retention for a further period'*. The duration of UWF Related Works will mirror the operational lifetime of the windfarm. UWF Grid Connection will remain in permanent operation, and will not be decommissioned. UWF Replacement Forestry will be a permanent woodland and will not be harvested.

The potential for significant impacts to the Slievefelim to Silvermines Mountains SPA relates only to the construction and operational stages which were therefore screened in to the impact evaluation tables in this Section 6.9.3.

The potential for significant effects to the Slievefelim to Silvermines Mountains SPA during decommissioning of Whole Upperchurch Upperchurch Windfarm project are screened out as decommissioning works will take place at the turbine hardstanding locaitons, will be limited in scale and of short duration. UWF Related Works decommissioning is limited to Haul Route Works and the pulling of cables from the Interal Windfarm Cabling ducts. Any necessary Haul Route Activities to transport the turbine blades off-site will be carried out from the public road carriageway.

Evaluation of In-Combination Effects:

The evaluations of the impact of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project on the Special Conservation Interests of the Slievefelim to Silvermines Mountain SPA takes into account the in-combination effect of the Whole UWF Project, and the in-combination effect of the Whole UWF Project with the following other unrelated projects and activities:

- Rearcross Quarry
- Castlewaller Windfarm
- Bunkimalta Windfarm
- Milestone Windfarm
- Agriculture, Forestry and Turf-cutting in the surrounding area.

A description of the other projects is included in Section 2.8 of this report.

The location of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project in relation to the Slievefelim to Silvermines Mountain SPA is illustrated on the following mapping:

AA 2021 Figure 11: Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Slievefelim to Silvermines Mountain SPA

6.9.3.1 Evaluation of SPA Impacts 1, 2, 3 & 4

6.9.3.1.1 Effects on SCI species along Pathways 2 & 3 from Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat

Impact Description

Project Life Cycle Stage: Construction/Operational stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: NONE

Whole UWF Project Impact Source: Land cover change, vegetation clearance; earthworks, forestry felling, removal of hedgerows

Other Unrelated Project/Activity Cumulative Impact Source: Land cover change from Agricultural Practices such as drainage, Direct habitat loss through peat extraction of intact bog, and habitat loss through forest maturation.

Impact Pathway: Land cover

Impact Description: Hen Harrier is a very high sensitivity receptor of International Importance and special conservation interest of the SPA under consideration.

Permanent Land take or land use/cover change of positively selected foraging habitats (i.e. suitable and within the established core range for connectivity to a nest) during the construction stage may cause secondary effects for this Annex I species and SPA special conservation interest. Studies have shown that most foraging takes place within 2km of the nest site, and as per SNH Guidance this is considered the core foraging range for Hen Harrier. The magnitude of effects is distance (to nearest nest) dependant, as the area within a certain radius of the nest increases as the square of this distance, for example hunting concentration becomes 10 times less between 2km and 5km from the nest compared to within 2km of the nest (Irwin *et al.,* 2012).

Although home range size may vary between locations and across individuals, it is clear from studies that Harrier females during the breeding season hunt closer to nests than males (e.g. Arroyo *et al*., 2006[25]); home ranges of females are centred on nest sites and on average may be half the area of that of males. In a Scottish study (Arroyo *et al.*, 2014[26]) female harriers mostly hunted within 1km of nests.

Male birds have larger home ranges (Arroyo *et al.,* 2006, 2014), but studies also suggest that male harriers mostly hunt within 2km of the nest (Arroyo *et al*., 2014), but can hunt further away (out to 10km (SNH, 2016)). In a study of Northern Harrier, Martin 1987, found that 85% of all male activity occurred within 3km of the nest. Furthermore, studies have shown that the amount of time spent foraging by Hen Harrier (expressed in min/km^2) decreases with distance from the nest (Madders (2003)).

Of particular importance and where pathways for likely significant effects are more likely are lands which provide high quality foraging habitat (both within the SPA boundary and ex-situ) within 2km of nests and on which breeding Hen Harrier (male or female birds) may be dependent during key periods of the breeding cycle such as provisioning young. Loss of suitable habitat may affect breeding success/productivity for one whole cycle, or until vegetation is re-instated both when considered alone and in combination with other possible sources of loss. Loss of high dependency foraging habitat, where it occurs in close proximity to nesting locations, at key periods of the breeding cycle may result in reduced productivity and/or nest success, in particular where it occurs within 2km of a nest location ***and*** where limited alternative habitat is available. Effects on nesting success may impact conservation objectives around maintaining the favourable conservation condition of the bird species through affecting breeding success (annual breeding output) and in turn population status, dynamics and/or future viability. Short term effects such as over a single breeding season are less likely to impact future viability of the SPA population however a precautionary approach is taken.

The degree of existing foraging habitat within the core foraging range (both within and outside the SPA boundary) is relevant in determining the dependency/reliance on any suitable habitat outside of this range, and consequently on the significance of any loss.

The creation of, or sympathetic management of, foraging and nesting habitat within the traditional range of breeding hen harrier positively affect nest success (Forrest *et al.,* 2011)**.**

Impact Quality: Negative, positive and neutral (varies per project)

[25] Arroyo, B., Leckie, F., Redpath, S. (2006) Habitat Use and Range Management on Priority Areas for Hen Harriers: Final Report. Report to Scottish Natural Heritage. First draft- March 2006.

[26] Arroyo, B., Leckie, F., Amar, A., McCluskie, A. & Redpath, S. (2014) Ranging behaviour of Hen Harriers breeding in Special Protection Areas in Scotland. Bird Study 61: 48-55.

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat

Authorised Upperchurch Windfarm

Impact Magnitude:
Upperchurch Windfarm is located outside the SPA.
As per the 2013 RFI the magnitude of foraging habitat loss was calculated as 95Ha (actual loss plus effective loss through displacement effects). For completeness, given that the estimate of total displacement was based on 2017 as the construction year, an upwardly revised total estimate of **101.27** Ha has been extrapolated from data provided in the Upperchurch Windfarm RFI (2013) (See Reference Documents 3 of 36, Table 7 of the UWF Ecological Management Plan). This figure corresponds with 2022 as the construction year – however it is still less than the 128Ha of lands to be provided/managed as additional favourable foraging areas under the conditioned Upperchurch Hen Harrier Scheme (evaluated other 'UWF Other Activities').
The nearest nest within the SPA is nest H1, which is 5.3km from the Upperchurch Windfarm. Foraging habitat surveys (*undertaken for UWF Grid Connection in 2019*) of the 2km core foraging habitat area around Nest Site H1 demonstrate that there is at minimum 51% suitable foraging habitat within 2km of the nest (644Ha of suitable foraging habitat and ca.24km of linear features), and it is evaluated that there will be no reliance by foraging Hen Harrier on suitable habitat therefore at the Upperchurch Windfarm site. There is a Very low probability therefore of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success.
The amendments to the windfarm substation (approved in December 2020) do not increase the area of reduction/loss of suitable foraging habitat associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- The effective loss of 101.27Ha of habitat constitutes an effect of medium magnitude (5-20% of available habitat lost);
- However, this is located outside the SPA boundary;
- The implementation of the Upperchurch Hen Harrier Scheme, as conditioned;
- Very High sensitivity of the species, and;
- Long term duration.
- Favourable Conservation condition of the SCI species, will not be impacted through any reduction in habitat, range, population status or viability.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: None – absence of impact sources

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:
No sources of impact associated with the Proposed Larger Turbines and Met Masts amendment because
- the amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not require any changes to the footprint of the windfarm (including vegetation clearance, earthworks, forestry felling or removal of hedgerows) associated with the authorised windfarm, and therefore
- Due to an absence of impact sources, the Proposed Larger Turbines and Met Masts amendment will not contribute to effects to the Slievefelim to Silvermines Mountain SPA;.
- the Proposed Larger Turbines and Met Masts amendment will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Slievefelim to Silvermines Mountain SPA;
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Slievefelim to Silvermines Mountain SPA.

Special Conservation Interest:
- No effects on SCI species Hen Harrier [A082] via reductions in habitat, range, population status or viability, through permanent or temporary loss of foraging habitat.

Evaluations of the Other Elements of the Whole UWF Project

– Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019). Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:

Note: Within the UWF Related Works site, HW7 is the only location where the UWF Related Works site boundary overlaps the Slievefelim to Silvermines Mountain SPA. No construction works and no land use change will take place within the SPA boundary, in line with the precautionary principle, to avoid effects on habitats possibly suitable for Hen Harrier. All other UWF Related Works locations and lands are located outside the SPA.

Total permanent land take of suitable foraging habitat is confined to improved agricultural grassland (0.12Ha); Wet Grassland (0.07Ha), upland blanket bog/Conifer mosaic (0.01Ha), Mature or closed canopy conifer plantation (0.28Ha) and scrub (0.004Ha) and totals 0.48Ha. None of this 0.48ha of suitable foraging habitat is within 2km (i.e. the core range) of an identified nest- in fact the nearest is Nest Site H1 at 4.5km to the west, within the SPA.

Foraging habitat surveys of the 2km core foraging habitat area around Nest Site H1 demonstrate that there is at minimum 51% suitable foraging habitat within 2km of the nest (644Ha of suitable foraging habitat and ca.24km of linear features), and it is evaluated that there will be no reliance by foraging Hen Harrier on suitable habitat therefore at the UWF Related Works site. There is a Very low probability therefore of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success, and; Temporary habitat loss relates to up to 4.6km of internal cabling located in agricultural lands and 2.1km located in forestry lands, in addition to c.1500m of temporary access roads at 4 no. differing locations; all of which will occur outside the Hen Harrier breeding season as Project Design. All these lands will be available for foraging within one growing season once vegetation has re-established. All temporarily removed sections of field boundary will be re-instated following the completion of works in any area, with at least 3-year-old native species.

In addition, a net gain of ca.370m of new hedgerow will be planted at the UWF Related Works site. This will comprise locally sourced native species.

Overall the magnitude of foraging loss as a result of the development of UWF Related Works is evaluated as Negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- The very high sensitivity rating of the species (context), and negligible magnitude;
- The small extent of permanent habitat loss, evaluated as a very slight change from baseline condition, and;
- The long-term duration of permanent habitat loss, however;
- No effects will take place within the SPA;
- The Separation distance from the SPA;
- The reversibility of temporary habitat loss is expected within the temporary-short term period, also;
- The nearest active Hen Harrier nests are at least 4.5km from works, and foraging habitat surveys demonstrate that at this distance there will be no reliance by nesting Hen Harrier on the foraging habitat at UWF Related Works;
- The reversibility of the impact with the reinstatement of lands at temporary works locations.
- Based on distance to nest H1 , Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success,
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability.

UWF Grid Connection (authorised)

Impact Magnitude:

There will be no temporary loss of suitable foraging habitat as a result of the construction of UWF Grid Connection within or outside the SPA.

Permanent land use change will only occur at the Mountphilips Substation site in Coole and Mountphilips townlands, located outside the SPA. All works for UWF Grid Connection outside of the Mountphilips Substation site (i.e. the 110kV UGC) will take place on paved roadways where there is no potential for any temporary or permanent, suitable habitat loss.

The amount of suitable habitat loss at the Mountphilips Substation site relates to a very small area (0.05ha or $^1/_7{}^{th}$ of an acre) of wet grassland (GS4) which will permanently change to new access road. This area of suitable habitat is located in the 2nd field between the site entrance and the substation compound. As the nearest nest (Nest Site A) is 4.6km from this suitable habitat at the Mountphilips Substation site, this habitat is considered to be sub-optimal based on distance from nest, within the context of the species preference for nest site fidelity and the available habitat within the core foraging range.

Foraging habitat surveys have shown that c. 33% of lands within 2km of Nest A comprise suitable foraging habitat (420ha at minimum plus 77km of linear features), supporting the assertion that there will be no reliance by nesting birds on the suitable habitat at the Mountphilips Substation site, based on habitat availability closer to the Nest A location. Therefore, the magnitude of foraging habitat loss is evaluated as Negligible.

In addition it is considered that whilst male harriers can occur and forage at distances greater than 3km from a nest, given the project design measures as part of the project, that the probability of foraging birds occurring at this isolated location (in the context of the nearby SPA and available habitat therein), and at frequencies sufficiently high to result in significant consequences on breeding, is very low.

As part of the design of the Mountphilips Substation site, 700m of new hedgerow, comprising a mix of native tree species, will be planted along each side of the new access road during the construction stage, and will provide permanent suitable foraging habitat in the form of new linear features at the Mountphilips Substation site. However, due to the separation distance from the nearest nest, the magnitude of this positive impact will also be Negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier, and Negligible magnitude of foraging habitat loss;
- Long term (permanent) duration, and low reversibility;
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success, and;
- the separation distance of >4.5km from landcover change to nearest known nest (Nest Site A) within the study period;
- Studies have shown that most foraging occurs within 2km of a nest and reduces thereafter with distance;
- The very small extent of suitable habitat which will be lost – 0.05ha;
- The scale and availability of suitable foraging habitat within 2km of Nest Site A, and the distance to Mountphilips;
- The magnitude of effect, on the sensitive aspect Hen Harrier, following Percival *et al*. is evaluated as 'Negligible' (0-1% of habitat lost), equivalent to a non-distinguishable change away from baseline conditions, and;
- The provision of 700m of new hedgerow along the new access road, will provide new permanent linear habitat in the longer term for hen harrier.
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability

UWF Replacement Forestry (licensed)

Impact Magnitude:

UWF Replacement forestry is not located within the SPA.

Available foraging habitat for Hen Harrier currently within the land folio boundary comprises improved agricultural grassland (3.54Ha); Wet Grassland (0.44Ha) and Scrub (0.01Ha); in total 3.99Ha. This entire area will undergo landuse change to UWF Replacement Forestry (deciduous forestry) to be managed specifically for the use of Hen Harrier, including the incorporation of 'tried and tested' management measures which will facilitate Hen Harrier foraging and usage such as the provision of ride lines and clearings within the new woodland.

Although the nearest nest site to UWF Replacement Forestry is 6.8km to the west (Nest Site H1), which has >50% suitable habitat available for foraging within 2km of the nest (644Ha plus ca.23km of linear features), the location of the UWF Replacement Forestry adjacent to Upperchurch Hen Harrier Scheme areas, will increase the availability of suitable foraging habitat for Hen Harrier outside but proximal to the SPA, and therefore the magnitude of this positive impact is evaluated as Medium.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- The very high sensitivity rating of the species, and the demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The small extent of lands to be managed for Hen Harrier, and;
- The permanent duration, and;
- The Non-reversibility with the new woodland being a permanent woodland, which will not be harvested.
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability.

UWF Other Activities

Impact Magnitude:
Neither Haul Route Activities nor Monitoring Activities nor Overhead Line Activities will not result in any loss of foraging habitat either within or outside the SPA.
In total 128ha of habitat will be managed as part of the Upperchurch Hen Harrier Scheme to increase the area of Hen Harrier foraging habitat in proximity to the authorised Upperchurch windfarm, measures set down in the Upperchurch Hen Harrier Scheme to achieve this include:
- Rush management to control coverage and increase suitability for foraging habitat, promoting prey item species;
- 2,085m increase in hedgerow, resulting in increased edge habitat for foraging and prey items;
- 3ha enclosures of native scrub and trees, increased cover for prey item species;
- Lines of electric fence with plastic fliers so that they are more visible to the Hen Harrier, to avoid mortality;
- Enhancement of the riparian corridor (to maintain corridor value for foraging Hen Harrier): 1220m of woody scrub species, and erect fencing to make stockproof and exclude access to river by livestock.
- The following restrictions will apply to landowners within the Upperchurch Hen harrier Habitat scheme (to maintain habitat suitability): Limited spreading of fertilizer (every 4-5 years); Limited spreading of lime (every 4-5 years); No burning; No excavation of drains or reclaiming heath or bog.

In addition to the management described, workshops are proposed with landowners to advise landowners on the importance and implementation of the above measures.
In total 128Ha of agricultural lands will be managed for the benefit of Hen Harrier, outside the turbine 250m buffer and the footprint of the development; as per the Upperchurch Windfarm EMP. The net gain to Hen Harrier is 128Ha-101.27Ha which is 26.73Ha. The magnitude of this gain is evaluated as High as it constitutes a major alteration to the baseline features present.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- The demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The extent of lands to be managed for Hen Harrier, and;
- The long term duration, and;
- Low reversibility.
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment)
– Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the European Site - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder:

Whole UWF Project Cumulative Impact Magnitude:
Both positive and negative quality effects occur with regard to Hen Harrier foraging habitat loss and gain across the Whole UWF Project. No negative quality effects occur within the SPA.
Negative effects which stem from the Whole UWF Project refer to permanent landcover change of 0.05Ha of suitable foraging habitat (GS4) at the UWF Grid Connection Mountphilips Substation site; and 0.48ha of permanent landcover change of suitable habitat at the UWF Related Works site. The affected habitat at both sites is outside the SPA and is considered sub-optimal due to the separation distance to the nearest Hen Harrier nest (4.6km and 4.5km respectively). Foraging habitat surveys at nearest nests demonstrate that there is sufficient foraging habitat available to Hen Harrier within the core 2km foraging range of each (34% at Nest A and 51% at Nest H1), and it is considered that there is no reliance on lands at either the Mountphilips Substation site or UWF Related Works sites. Overall the

magnitude of negative habitat loss is considered to be Negligible. The provision of 700m of new hedgerow at the Mountphilips Substation site for UWF Grid Connection and 370m of new linear habitat at the UWF Related Works site will provide new linear foraging habitat for Hen Harrier, albeit outside of the core foraging range from the nearest nests.

The negative effects of Upperchurch Windfarm, outside the SPA, which is evaluated herein within the context of effective displacement based on a revised construction date of 2022 (as per the Upperchurch Windfarm RFI 2013); is effectively mitigated by the activities consented under the Upperchurch Hen Harrier Scheme (UWF Other Activities), which as intended results in a net gain through design to Hen Harrier both in area and quality of habitat. The provision and management of UWF Replacement Forestry (4ha) specifically for Hen Harrier, outside but proximal to the SPA and adjacent to the Upperchurch Hen Harrier Scheme also contributes to an overall net gain to Hen Harrier of an additional 30.73Ha of actively managed foraging habitat (net gain to Hen Harrier due to Hen Harrier Scheme is 128Ha-101.27Ha which is 26.73Ha, and the additional 4ha due to the UWF Replacement Forestry, giving a total net gain of 30.73Ha).

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):
No adverse effects on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Impact Evaluation:

- No negative quality effects will occur within the SPA;
- The demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The extent of lands to be managed for Hen Harrier overall (128Ha + 4ha =132ha), and;
- The long term to permanent duration, given that UWF Replacement Forestry will be a permanent woodland and will not be harvested, and;
- The negligible magnitude of habitat loss from the UWF Grid Connection Mountphilips Substation site which is located outside of the core foraging range of the nearest nest (4.6km) and also the absence of any habitat loss effects from the UWF Grid Connection 110kV route;
- The negligible magnitude of habitat loss from the UWF Related Works site which is located outside of the core foraging range of the nearest nest (4.5km),;
- The reversibility of negative effects with reinstatement of lands, provision of new hedgerow, planting of a new permanent woodland and the application of the Upperchurch Hen Harrier Scheme and other measures as described.
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) with Other Unrelated Projects & Activities

– Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat

Due to an absence of impact sources, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activities on the European Site - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019 (reproduced hereunder).

Whole UWF Project + Other Projects & Activiites Cumulative Impact Magnitude: The magnitude of foraging habitat loss resulting from the Whole UWF Project, consented Castlewaller Windfarm, potential Bunkimalta Windfarm, existing Milestone Windfarm, and agriculture and turf cutting in the vicinity are evaluated as largely neutral. Forestry activities in the surrounding area are generally a negative trend in the background environment currently with declines in available foraging habitat in the short-medium term (next 10 years & expected to increase subsequently and evaluated as significant in that regard. Effects from Hen Harrier management plans in respect of the consented Castlewaller, potential Bunkimalta and existing Milestone Windfarms will neutralise the effects of these windfarms and it is assumed that the potential Castlewaller grid connection will not result in land use change likely to result in adverse effects on breeding Hen Harrier territories which it potentially overlaps. There will be a net gain from the Whole UWF Project which is at minimum 30.73Ha. Overall the magnitude is Low.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities:
No adverse effects on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Cumulative Impact Evaluation:

- Absence of negative quality effects from the Whole UWF Project on lands within the SPA;
- The net gain in terms of lands managed specifically for the use of Hen Harrier, and;

- Extent of lands to be managed in total, notwithstanding,
- The medium-term duration of negative trend in respect of reductions in forestry based foraging habitat.
- Separation distances to identified nests, with all locations of habitat loss or reduction located outside the core foraging range of hen harrier (i.e. >2km).

Other Projects

- The effective habitat loss associated with Milestone Windfarm, Castlewaller Windfarm and Rearcross Quarry is mitigated by the management of lands for the benefit of Hen Harrier, over the lifetime of the wind farm;
- Due to their location within a designated site, the requirement on any future Bunkimalta Windfarm proposal or future Castlewaller grid connection proposal to prove that no significant adverse effects will occur;
- The volumes of aggregate required for the Whole UWF Project will be supplied within the current consented capacity of the Rearcross Quarry;
- Further new afforestation not likely within the SPA, in the context of longer-term background trends are likely to become neutral, and with requirement on projects within a designated site (including planting /felling licenses and ancillary activities or works) to prove that no significant adverse effects will occur;
- The restrictions on further turf cutting in intact areas/protected areas, the limited extent of lands subject to turbary (rights to cut turf) within the Hen Harrier SPA overall (4%), with little of this occurring within the cumulative evaluation study area; and the reversibility of any effect, (in the context of Hen Harrier) with birds expected to continue to utilize re-vegetating cutover bog for foraging;
- Information on trends in agriculture in relation to intensification or abandonment is generally unavailable, but not expected to change significantly.
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability.

6.9.3.1.2 Effects on SCI species along Pathways 2 & 3 from Reduction in Prey Item Species

Impact Description

Project Life Cycle Stage: Construction stage/Operational Stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: operating wind turbines

Whole UWF Project Impact Source: Land cover change, vegetation clearance, noise and visual intrusion; operating machinery; presence of construction personnel, Excavations, Forestry Felling, removal of Hedgerows,
Other Unrelated Project/Activity Cumulative Impact Source: Forestry Felling, land cover change from agricultural practices such as drainage, peat extraction
Impact Pathway: land cover, air, visibility, direct contact
Impact Description: Hen Harrier preferred prey species are typically described as those of open ground, such as Meadow Pipit (*Anthus pratensis*) and Skylark (*Alauda arvensis*). Hen Harriers breeding numbers are typically correlated with the abundance of small mammals in the UK (Redpath et al., 2002a; 2002b; Thirgood et al., 2003), however this relationship does not appear to exist in Ireland perhaps due to the absence of short-tailed vole (*Microtus agrestis*) (see O'Donoghue, 2010). Preferred prey species in Ireland have been described as Meadow Pipit, Wood Mouse (*Apodemus sylvaticus*) and other small passerines during the breeding season with Meadow Pipit, Brown Rat (*Rattus norvegicus*) and wintering thrushes predominating in winter (O'Donoghue, 2010).

In a published study of 900 Hen Harrier pellets in Ireland covering winter and breeding seasons, Hen Harriers were found to have a diverse diet, which varies between areas and seasons and includes small mammals, birds, amphibians and reptiles – up to 78% of the diet of Hen Harriers in Ireland was shown to comprise passerine species of birds (Irwin *et al.,* 2012). Winter diet at coastal roosts found various bird species forming 77.2% of diet (by percentage frequency); birds were predominantly passerines (Smiddy & Cullen, 2017).

Reductions in the availability of Prey Items (passerine songbirds, small mammals, reptiles and amphibians) may disadvantage foraging Hen Harriers, in particular during the breeding season when provisioning young. These reductions will typically be related to construction stage disturbance displacement (although this is likely to be temporary in duration and reversible) and any operational habitat loss (as habitat loss or loss in quality of existing habitat may have a direct effect on the composition and numerical abundance of the prey that inhabit it) and therefore consideration is given to both. Effects on nesting success may impact conservation objectives around maintaining the favourable conservation condition of the bird species through affecting breeding success (annual breeding output) and in turn population status and/or future viability. Short term effects such as over a single breeding season are less likely to impact future viability of the SPA population however a precautionary approach is taken.

Intensity of agricultural management is known to negatively affect densities of songbirds with small mammal abundance in grassland related to the height and diversity of vegetation present. The effects of Habitat Loss (permanent or Temporary Reduction or Loss of Suitable Habitat) and the effects thereof on Hen Harrier are considered separately in this NIS (See Section 6.9.3.1.1).

Impact Quality: neutral, negative and positive

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Reduction in Prey Item Species

Authorised Upperchurch Windfarm

Impact Magnitude:
Upperchurch Windfarm is located outside the SPA. The 2013 EIS recorded various prey items as present or likely to be present including Field Mice, Pygmy Shrew, Rabbit, Irish Hare, Common Lizard, Common Frog in addition to passerine bird species including Meadow pipit, Skylark and thrushes. During construction, effects on fauna including through noise and anthropogenic effects were evaluated as of low magnitude, temporary in duration and limited to the construction phase with the overall impact not significant.
In terms of operational effects, the magnitude of foraging habitat loss was estimated as 95Ha (now revised to 101.27Ha to reflect a construction year of 2022). 128ha of lands are to be provided and managed as favourable foraging areas including habitats specifically targeted at providing prey for Hen Harrier such as passerine birds and small mammals. A reduction in the intensity of management and the reversion of some fields back to wet grassland will improve the availability of small mammals and birds for Hen Harrier. Reduction in Prey Items via

collision with operating Upperchurch Turbines is not likely to impact passerine prey items species as passerines are not significantly affected by wind turbines due to the generally low heights at which passerines fly, (as per SNH 2017).

Any reduction in prey item availability to Hen Harrier is evaluated as negligible in the context of distance from nearest nests within the SPA – H1 is 5.3km, while the nearest nest outside the SPA (Glenough) is 4km away from the windfarm site.

The amendments to the windfarm substation (approved in December 2020) do not increase landcover change, vegetation clearance or levels of activity and personnel associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- The implementation of the Upperchurch Hen Harrier Scheme, as conditioned;
- Very High sensitivity of the species, and Negligible magnitude;
- Effects are ameliorated by virtue of distance to the nearest nest/SPA, resulting in an evaluation of no reliance on foraging habitats at the windfarm site and in turn prey items present at the windfarm site
- Long term duration.
- Due to the negligible magnitude of prey item effects, the Proposed Larger Turbines and Met Masts amendment will not cause adverse effects to the Slievefelim to Silvermines Mountain SPA;.
- the Proposed Larger Turbines and Met Masts amendment will not result in any material changes to the impact of the authorised Upperchurch Windfarm on the Slievefelim to Silvermines Mountain SPA;
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Slievefelim to Silvermines Mountain SPA.

Special Conservation Interest:

- Favourable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through reductions in prey item effects.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude: No sources of habitat loss (via land-cover change or disturbance) associated with Proposed Amendment. The source of Reduction in Prey Item Species relates only to an increased turbine and met mast size. This impact however will not result in effects at a prey item population level within the study area - while the larger turbines represent a potential increase in collision risk impact on passerine species due to the increase in wind-sweep area of the blades, prey item passerine species, including meadow pipit and skylark, are not considered to be at risk of collision with the operating wind farm as their flight heights are generally well below the lowest point of a rotating turbine blade (Scottish Natural Heritage, 2017). The met masts are scoped out as a source of collsion risk.

Given the above and considering the low levels of harrier activity within the site, and the separation distance to the nearests nests (H1, 5.3km within the SPA, and Glenough 4km ex-situ the SPA), the impact significance is neutral.

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any additional land cover change, and therefore not impact prey item species via habitat loss;
- The amendment only relates to the turbine and met mast structures,and will not result in any changes to construction works or activities (including, vegetation clearance, excavations, forestry felling, removal of hedgerows, use of machinery) or to works locations or to numbers of construction personnel associated with

the authorised windfarm, this in addition to the minor nature of the operational stage activities will therefore not impact prey item species via disturbance;

- While the Proposed Larger turbines will have a larger blade swept area, common resident passerines, includingmeadow pipit and skylark, are not considered to be at significant risk of collision with the operating wind farm as their flight heights will be generally well below the lowest point of the rotating turbine blades (Scottish Natural Heritage, 2017), and therefore;
- the Proposed Larger Turbines and Met Masts amendment will not contribute to reduction in prey item species effects to the Slievefelim to Silvermines Mountain SPA and will not result in any changes to the impact of the authorised Upperchurch Windfarm on the Slievefelim to Silvermines Mountain SPA;
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Slievefelim to Silvermines Mountain SPA.

Special Conservation Interest:

- No effects on SCI species Hen Harrier [A082] via reductions in habitat, range, population status or viability, through reductions in prey item species.

Evaluations of the Other Elements of the Whole UWF Project – Reduction in Prey Item Species

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: General mammal species such as Brown Rat, Shrews, Mice, Bank Vole, Hare and Rabbit are expected to be present in low densities (resulting in an importance evaluation of Local Importance, Lower Value), due to the limited extent of permanent land use change of natural habitats, and the high likelihood of no observable changes to existing trends as a result of the UWF Related Works impacts have been evaluated as Neutral. Residual impacts on Amphibians and Reptiles have been evaluated as Neutral. The impact magnitude of habitat loss on Meadow Pipit (as a receptor) was evaluated as negligible. The likelihood of significant effects on other passerine species were excluded. The nearest Hen Harrier nest to UWF Related Works (H1) is 4.5km and is within the SPA, on this basis foraging habitat loss for Hen Harrier was evaluated as negligible.
Overall any reduction in prey items for Hen Harrier is evaluated as negligible.

Significance of the Impact: Not adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- The very high sensitivity of the species, and Negligible magnitude however;
- Some noticeable changes in the character of the environment from a prey availability perspective to Hen Harrier may be possible;
- The extent of suitable habitat for Meadow Pipit to be affected represents a minor shift away from baseline conditions, and;
- Effects are ameliorated by virtue of distance to the nearest nest/SPA, resulting in an evaluation of no reliance on foraging habitats at the site and in turn prey items which may be present at the UWF Related Works Site.
- Favourable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through reductions in prey item effects.

UWF Grid Connection (authorised)

Impact Magnitude:

General mammal species such as Brown Rat, Shrews, Mice, Bank Vole, Hare and Rabbit are expected to be present in low densities (resulting in an importance evaluation of Local Importance, Lower Value),), due to the limited extent of permanent land use change of natural habitats, and the high likelihood of no observable changes to existing trends as a result of the UWF Related Works impacts have been evaluated as Neutral. Residual impacts on Amphibians and

Reptiles have been evaluated as Neutral, effects on general passerine species apart from Meadow Pipit are excluded, and residual impacts on General Birds range from Imperceptible or Neutral to Slight (Positive) – (see UWF Grid Connection EIAR 2019, Chapter 8 Biodiversity, Section 8.10 and 8.7 – Reference Document 7 of 36). Effects on Meadow Pipit from the UWF Grid Connection were evaluated as 'not significant' due to the limited extent of land use change, only at Mountphilips Substation site. This land use change has also been evaluated as to its effect on Hen Harrier through loss of foraging habitat and found to be negligible in magnitude. This land use change has also been evaluated as to its effect on Hen Harrier through loss of foraging habitat and found to be negligible in magnitude. A potential reduction in prey item availability only relates to the Mountphilips Substation Site, where suitable foraging habitat comprising 0.05ha will be lost – evaluated as negligible. Numbers of prey items likely to occur within this area are considered less than negligible in the context of prey availability, for example a typical Meadow Pipit average home range size of 2.18ha has been described, inferring at most a single pair of pipits could be lost permanently.
Overall magnitude is evaluated as Negligible, i.e. barely distinguishable and approximating to a 'no change' situation.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- The very high sensitivity of the species and negligible magnitude, however;
- No noticeable changes in the character of the environment from a prey availability perspective are predicted.
- Distance from the only source (Mountphilips Substation site) of a reduction in Prey Items to the nearest hen harrier nest (greater than 4km).
- Favourable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through reductions in prey item effects.

UWF Replacement Forestry (licensed)

Impact Magnitude:
While the UWF Replacement Forestry will be of benefit to Hen harrier in the long term, during its planting it has potential to disturb or displace prey items with land use change during operation also requiring consideration. It is located outside the SPA under consideration.
General mammal species such as Brown Rat, Shrews, Mice, Bank Vole, Hare and Rabbit have been scoped out from consideration due to the limited extent of planting works, the general (low) densities likely to be present (resulting in an importance evaluation of Local Importance, Lower Value) and the high likelihood of no observable changes to existing trends as a result of the authorised UWF Replacement Forestry. No measurable impacts were predicted on Amphibians and Reptiles and therefore no likely significant effects are reasonably foreseeable. The impact magnitude of habitat loss on Meadow Pipit was evaluated as slight based on the change of 3.98Ha of suitable habitat to forestry- inferring up to 2 pairs of Meadow Pipit may be affected. However, the magnitude of displacement of Meadow pipit during the planting stage/early growth stage of the new woodland is reduced through the planting by hand of the new trees, no requirement to clear grass from the site, and the very short duration of works. It is considered that the lands will remain available to Meadow Pipit for a number of years while the new trees start to establish – however in the long term some habitat for ground nesting birds will be lost, to be replaced with habitat for other passerine species, which will also be potentially available to Hen Harrier as prey items. The likelihood of significant negative quality effects on other passerine species were excluded. The nearest Hen Harrier nest to UWF Replacement Forestry (H1) is 6.8km, on the basis of the authorised management of the afforested lands for Hen Harrier, the effects of land cover change on Hen Harrier foraging habitat were evaluated as Very Significant (positive).
Overall any reduction in the availability of prey items for Hen Harrier is evaluated as Low (Positive).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- The very high sensitivity of the species, and negligible magnitude;
- Some disturbance/displacement of Meadow Pipit during planting and long term due to land cover change is likely, however;
- Planting works will be carried out by hand, and will not involve the clearance of grass from the lands. The lands will become available to prey items immediately after planting works are complete until the new trees start to establish.
- Effects are reduced by the relatively small extent and duration of works, the replacement of open habitats with habitats to be managed for Hen Harrier and by virtue of distance to the nearest Hen Harrier nest;
- Management measures will also provide foraging opportunities for Hen Harrier, of permanent duration
- Favourable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through reductions in prey item effects.

UWF Other Activities

Impact Magnitude:
Due to their scale and nature, the magnitude of any disturbance effect to prey items (and resultant reduction in numbers available to hen harrier) as a result of Haul Route Activities, Monitoring Activities, or Overhead Line Activities will be negligible.
Activities for the Upperchurch Hen Harrier Scheme will take place in agricultural lands outside the SPA, where prey item species may occur. However, these activities will be similar to background farming activities. Overall the magnitude of reduction in prey item availability will be negligible. In total the UHHS will provide 128ha of habitat which will be managed to increase the area of Hen Harrier foraging habitat, measures set down in the Upperchurch Hen Harrier Scheme to achieve this include:
Rush management to control coverage and increase suitability for foraging habitat, promoting prey item species;
2,085m increase in hedgerow, resulting in increased edge habitat for foraging and prey items;
3ha enclosures of native scrub and trees, increased cover for prey item species

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:
- Very High sensitivity of the species and negligible magnitude (Haul Route Activiteis, Overhead Line Activities), and;
- The implementation of the Upperchurch Hen Harrier Scheme, as conditioned

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment)
– Reduction in Prey Item Species

Due to an absence of impact sources in relation to landcover and disturbance, and no material change to collision risk to passerine species, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of all of the Elements as the Whole UWF Project on the European Site - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder. Potential for mortality impacts to Prey Item Species as a result of collision with turbine blades is addressed below.

Whole UWF Project Cumulative Impact Magnitude: The potential for reductions in the abundance in Hen Harrier prey item species will occur across the Whole UWF Project area as a result of habitat loss (both temporary and permanent) and disturbance/displacement from construction works and construction stage activities. Overall, general mammal species such as Brown Rat, Shrews, Mice, Bank Vole, Hare and Rabbit and amphibians and reptiles are likely to be present in low densities and observable changes to existing trends as a result of the construction of the Whole UWF Project are not expected. Due to the abundance of suitable habitat for passerines in the immediate wider area, general passerine species and Meadow pipit will not be significantly affected. Given the very small extent of suitable foraging habitat for Hen Harrier at the Mountphilips Substation Site, and the lack of reliance on habitats at the Upperchurch Windfarm/UWF Related Works site and the separation of both locations from the nearest hen harrier nest (greater than 4km), the likely continued use of the UWF Replacement Forestry lands in early growth stage of the new woodland along with the low numbers of potential prey items lost due to operational landcover change, with additional species likely to be promoted through management, and the nature of the UWF Other Activities, the magnitude of the Whole UWF Project impact is evaluated as no greater than the UWF Grid Connection alone, i.e. Negligible.
In relation to the Proposed Larger Turbines and Met Masts, the source of Reduction in Prey Item Species relates only to an increased turbine size and associated collision risk. This impact however will not result in effects at a prey item population level within the study area - while the Upperchurch Windfarm turbines (either the authorised or proposed larger size) represent a potential collision risk impact on passerine species, prey item passerine species including meadow pipit and skylark are not considered to be at risk of collision with the operating wind farm as their flight heights are generally well below the lowest point of a rotating turbine blade (Scottish Natural Heritage, 2017).
Given the above and considering the low levels of harrier activity within the site, and the separation distance to the nearests nests (H1, 5.3km within the SPA, and Glenough 4km ex-situ the SPA), magnitude is evaluated as Negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):
No adverse effects on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Impact Evaluation:
- The extent of lands to be managed for Hen Harrier prey items;
- The very high sensitivity of the species and negligible magnitude, however;
- No noticeable changes in the character of the environment from a prey availability perspective are predicted.
- Distance (and location outside the SPA) from the only source (Mountphilips Substation site) of a reduction in Prey Items to the nearest hen harrier nest (greater than 4km);

- The reversibility of the effect on temporary land cover change areas following the completion of construction and reinstatement works, and the completion of activities;
- While the Proposed Larger turbines will have a larger blade swept area, common resident passerines, includingmeadow pipit and skylark, are not considered to be at significant risk of collision with the operating wind farm as their flight heights will be generally well below the lowest point of the rotating turbine blades (Scottish Natural Heritage, 2017), and
- UWF Replacement Forestry lands will remain available to prey item species following planting works until the new trees start to establish.
- Favourable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through reductions in prey item effects.

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat

Due to an absence of impact sources in relation to landcover and disturbance, and no material change to collision risk to passerine species, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activites on the European Site - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder. Potential for cumulative mortality impacts to Prey Item Species as a result of collision with turbine blades is addressed below:

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: Both positive and negative quality effects occur with regard to Hen Harrier foraging habitat loss across the Whole UWF Project. The magnitude of any reduction in prey availability resulting from the Whole UWF Project, consented Castlewaller Wind Farm (including its potential grid connection), potential Bunkimalta Windfarm (including its consented grid connection), and turf cutting in the vicinity are evaluated as cumulative negligible due to the abundance of suitable habitat for prey item species in the immediate and wider upland area. Existing Milestone Windfarm and Rearcross Quarry are evaluated as neutral with the current management of lands for the benefit of hen harrier. Agricultural practices in the vicinity of works generally provide open habitats for hen harrier. Forestry activities in the surrounding area is generally a negative trend in the background environment currently with declines in available foraging habitat in the short-medium term (next 10 years & expected to increase subsequently and evaluated as significant in that regard. Overall the cumulative magnitude of the Whole UWF Project (during its construction) together with the Other Projects and Activities is evaluated as Negligible.

Due to the separation distance between sources of operational impact on Prey Item Species (collision with operating turibnes) at Upperchurch Windfarm and at Castlewaller/Bunkimalta windfarms, and considering the low levels of harrier activity within the Upperchurch Windfarm site, and the separation distance to the nearests nests (H1, 5.3km within the SPA, and Glenough 4km ex-situ the SPA), cumulative magnitude is evaluated as Negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities:

No adverse effect on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Cumulative Impact Evaluation:

- Whole UWF Project habitat loss is outside the SPA, and outside the likely range of usage by the nearest nest within the SPA;
- The very high sensitivity of the species and negligible magnitude;
- The availability of suitable habitat in the upland area and SPA;
- The net gain in terms of lands managed specifically for the use of Hen Harrier, and;
- Extent of lands to be managed in total, notwithstanding;
- The medium-term duration of negative trend in respect of reductions in forestry based foraging habitat;
- Distance to Nests from the various lands which will undergo management.

Other projects

- the effective habitat loss of Hen Harrier foraging habitat at Milestone Windfarm is mitigated by lands proposed to be managed for the benefit of Hen Harrier, over the lifetime of the wind farm, including the management of habitat for Prey Items:

- At Castlewaller Windfarm, the effective habitat loss is exactly equivalent to the area to be managed and improved for the benefit of Hen Harrier, over the lifetime of the wind farm; residual effects on general flora and fauna, including small mammals and amphibians and reptiles were evaluated as insignificant.
- Any future proposed Bunkimalta Windfarm will have to prove that impacts to Hen Harrier will not be significant (in the context of its location within a Hen Harrier SPA), this is likely to include measures in relation to preventing reductions in prey item species. The consented grid connection is routed along forestry roads and public roads where it occurs within the SPA
- No additional habitat loss (beyond that consented) is predicted in respect of the existing Rearcross Quarry operations thus no reduction in the availability of prey items will be associated with the use of this quarry (including for the supply of aggregate for the Whole UWF Project)
- a negative trend in relation to forestry, where the extent of useable forest is predicted to drop from 23% in 2012 to 11% in 2025 in the Slieve Felim to Silvermines Mountains SPA,
- the potential for intensification or abandonment of agricultural landuse to effect prey item abundance, in the context of the implementation of agri-environmental scheme such as the Hen Harrier Project.
- Restrictions on further turf cutting (and hence prey item habitat) in intact areas/protected areas, and; the limited extent of lands subject to turbary (rights to cut turf) within the Hen Harrier SPA overall (4%); and the reversibility of any effect, (in the context of Hen Harrier) with birds expected to continue to utilize re-vegetating cutover bog.

6.9.3.1.3 Effects on SCI species along Pathways 1 & 4 from Disturbance/Displacement of foraging Hen Harrier during the breeding season

Impact Description

Project Life Cycle Stage: Construction stage/ Operational Stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: Visual intrusion resulting from the presence and operation of the proposed larger turbines and met masts

Whole UWF Project Impact Source: noise and visual intrusion; operating machinery; presence of construction personnel, operating wind turbines

Other Unrelated Project/Activity Cumulative Impact Source: noise and visual intrusion; operating machinery; presence of people associated with farming and forestry management activities, turf-cutting, quarrying works and *potentially* other windfarm construction sites, operational turbines.

Impact Pathway: Air, Visibility

Impact Description:

The results of an extensive survey programme for Hen Harrier covering the Upperchurch Windfarm, UWF Related Works and UWF Grid Connection carried out between 2015 and 2020 have shown that usage by Hen Harriers of the Upperchurch Windfarm site has remained consistent with levels of activity recorded during bird surveys for the authorised development between 2010 and 2012 – i.e. low levels of activity. In addition, the baseline environment in terms of the 'sub-optimal' availability of suitable habitat for Hen Harrier has remained stable, a fact that is reflected in the continued low levels of Hen Harrier flight activity observed within the study site. Behavioural avoidance of operational wind turbines in hen harriers results in birds being displaced from suitable habitat in the vicinity of turbines; this has been documented in a number of studies (Wilson et al., 2015).

Breeding Hen Harriers are known to be sensitive to disturbance at or near the nest (Ruddock & Whitfield, 2007). Although estimates of disturbance distances between source and nest differ, a review by Ruddock & Whitfield (2007) suggests a conservative distance of effect of 1,000m, up to which birds at the nest could be disturbed during wind farm construction activities.

Disturbance to foraging birds away from the immediate vicinity of nests may also occur (Masden, 2010; Pearce-Higgins *et al*., 2012) either within or outside the SPA. This can impair foraging success during critical periods of the breeding season such as when provisioning young or result in increased energy expenditure and subsequent reductions in fitness. This may be dependent on whether or not sequential effects occur, levels of habituation to background disturbance or whether sufficient displacement habitat is available once a bird experiences a disturbance event. The degree or frequency of baseline foraging is an influencing factor, as is distance to nests as this is a likely determinant of dependency. Ultimately the magnitude of such effects if sufficient could impact on favourable conservation condition of a species within an SPA.

A minimum approach distance (MAD) as a function of flight initiation distance (FID) is used to determine the likelihood of any effect on an individual. There have been no specific studies examining the FID of foraging Hen Harriers to human disturbance. However, a study on FIDs on Northern Harrier *Circus cyaneus* from aircraft suggested a mean FID of 70m (Booms *et al.,* 2010) implying that birds may react to disturbance of similar magnitude (90db) at a distance of 105m. In a wider review of FIDs, Livesey et al. (2016) indicated a mean FIDs for Falconiformes of 89.7m (MAD 134.5m) (for pedestrian-based disturbance) and 79.7m (MAD 119.5m) (for motorised vehicles). Collectively, these data would suggest that foraging Hen Harriers are unlikely to be impacted by disturbance events over 150m away. Hen Harrier will also be habituated to certain background activities such as traffic and machinery on roads and on farmlands and would be expected to react less to artificial noise than to the presence of humans. Therefore, a 150m buffer from works locations is taken as the zone wherein effective habitat loss may take place following disturbance through noise or visual intrusion as a result of construction works and/or the presence of construction personnel, both within and outside the SPA. At distances further than 150m from construction works areas, noise or visual intrusion are unlikely to result in any noticeable effect on foraging Hen Harriers.

The magnitude of the disturbance/displacement effect is related to the likelihood of Hen Harrier being present within the 150m zone of potential impact, and therefore the availability of suitable foraging habitat and the distance of sources of disturbance/displacement to any given nest location is relevant.

The core foraging range for Hen Harrier is considered to be 2km from nests (Arroyo *et al.*, 2014; SNH, 2017) and only 2% of foraging occurs beyond 4km of nest sites (Arroyo *et al*., 2012). Although home range size may vary between locations and across individuals, it is clear from studies that Harrier females during the breeding season hunt closer to

nests than males (e.g. Arroyo *et al*., 2006[27]); home ranges of females are centred on nest sites and on average may be half the area of that of males. In a Scottish study (Arroyo *et al*., 2014[28]) female harriers mostly hunted within 1km of nests.Male birds have larger home ranges (Arroyo *et al.*, 2006, 2014), but studies also suggest that male harriers mostly hunt within 2km of the nest (Arroyo et al., 2014), but can hunt further away (out to 10km (SNH, 2016)). In a study of Northern Harrier, Martin 1987, found that 85% of all male activity occurred within 3km of the nest. Furthermore, studies have shown that the amount of time spent foraging by Hen Harrier (expressed in min/km^2) decreases with distance from the nest (Madders (2003)). In this context it is considered that whilst male harriers may occur and forage at distances greater than 4km from a nest, the likelihood of any dependence on (and by inference high frequency of occurrence at) locations where disturbance sources may occur during the breeding season, greater than 4km from a nest, is extremely low.

In relation to cumulative (sequential) effects, multiple sources of noise and visual intrusion occurring within the same spatial and/or temporal timeframe may combine should Hen Harriers encounter multiple sources of disturbance displacement in succession.
Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Disturbance/Displacement of foraging Hen Harrier during the breeding season

Authorised Upperchurch Windfarm

Impact Magnitude:
Out of 504 ha within the footprint and 150m of the consented Upperchurch Windfarm, only 135 ha (26.8%) is suitable for Hen Harriers to forage. This falls below the 30% threshold indicated as offering and attractive landscape to Hen Harriers (Wilson *et al*., 2006). The nearest nest location to the consented Upperchurch Windfarm is 5.3km (within the SPA) and 4km ex-situ the SPA. There is evidence to show that breeding Hen Harriers rarely (<2% of the time) forage more than 4km from the nest (Arroyo *et al*., 2012). Data from field surveys also indicate very low levels of Hen Harrier use within the footprint of the consented Upperchurch Windfarm (in 2019, 120 hours of breeding season VP observations yielded a total of 200 seconds of observed Hen Harrier activity, (of which 44 seconds were within 500m of a consented turbine location).
A zone of displacement of 250m around each Upperchurch turbine was examined in the 2013 EIS in response to RFI from Tipperary County Council. A total of 101.27ha of suitable foraging habitat was identified within the 250m displacement zone (*based on a construction year of 2022*). The 250m displacement zone does not overlap the SPA boundary. The randomness and low number of hen harrier observations during the vantage point surveys in 2010 and 2011 *(and during surveys in between 2015 and 2020)* demonstrates that Upperchurch is used infrequently by hen harriers. The very low number of observations would suggest that the magnitude of displacement from the authorised turbines would be negligible.
Given the distance from these observations to identified nests/the SPA, these are unlikely to be actively breeding birds, and the magnitude of this impact resulting from construction stage disturbance and operational stage displacement is considered to be negligible and unlikely to occur given the separation distance to the nearest nest (5.3km).
The amendments to the windfarm substation (approved in December 2020) do not change, works locations, levels of activity or personnel associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- Very High sensitivity rating for Hen Harrier and Negligible magnitude;
- Upperchurch Windfarm is outside the SPA;

[27] Arroyo, B., Leckie, F., Redpath, S. (2006) Habitat Use and Range Management on Priority Areas for Hen Harriers: Final Report. Report to Scottish Natural Heritage. First draft- March 2006.

[28] Arroyo, B., Leckie, F., Amar, A., McCluskie, A. & Redpath, S. (2014) Ranging behaviour of Hen Harriers breeding in Special Protection Areas in Scotland. Bird Study 61: 48-55.

- The low proportion (<30%) of suitable habitat for foraging Hen Harriers in the footprint and 150m buffer of the consented Upperchurch Windfarm; coupled with
- The distance of separation between the consented Upperchurch Windfarm the nearest Hen Harrier nest within the SPA at 5.3km, as Hen Harriers rarely forage more than 4km from the nest site; resulting in
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success, and
- The irregularity and low number of Hen Harrier observations during the vantage point surveys indicating that the consented Upperchurch Windfarm is used infrequently by breeding Hen Harriers.
- Favorable Conservation condition of the SCI species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.
-

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude:

No sources of disturbance as a result of construction or operational works/acitivities or presence of personnel associated with Proposed Amendment.

The source of displacement effects relates only to an increased turbine size. The results of an extensive survey programme for Hen Harrier covering the Upperchurch Windfarm, UWF Related Works and UWF Grid Connection carried out between 2015 and 2020 have shown that usage by Hen Harriers of the Upperchurch Windfarm site has remained consistent with levels of activity recorded during bird surveys for the authorised development between 2010 and 2012 – i.e. low levels of activity. In addition, the baseline environment in terms of the 'sub-optimal' availability of suitable habitat for Hen Harrier has remained stable, a fact that is reflected in the continued low levels of Hen Harrier flight activity observed within the study site. Behavioural avoidance of operational wind turbines in hen harriers results in birds being displaced from suitable habitat in the vicinity of turbines; this has been documented in a number of studies (Wilson et al., 2015). While the larger turbines represent a potential increase in disturbance magnitude, considering the infrequent Hen Harrier activity in the vicinity of the turbines, there is not expected to be any material change to disturbance/displacement to Hen Harrier as a result of the Proposed Larger Turbines and Met Masts, and the magnitude of displacement impacts is evaluated as low-negligible.

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

No adverse effects are associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to construction/operational activity (including use of machinery) or to works locations or to numbers of personnel associated with the authorised windfarm,
- The results of an extensive survey programme for Hen Harrier between 2015 and 2020 have shown that usage by Hen Harriers of the Upperchurch Windfarm site has remained consistent with levels of activity recorded during bird surveys for the authorised development between 2010 and 2012 – i.e. low levels of activity. Therefore given the low levels of Hen Harrier activity within the zone of influence of the proposed larger turbines and met masts, the potential for adverse effects resulting from operational stage dispacment is low and will not result in adverse effects on the integrity of the SPA.
- The baseline environment in terms of the 'sub-optimal' availability of suitable foraging habitat for Hen Harrier has remained stable, a fact that is reflected in the continued low levels of Hen Harrier flight activity observed within the study site.
- No turbines will be located within the core foraging range (2km) from known traditional nest sites; and no additional nesting sites are present within the likely zone of effect;
- Taking into consideration neglibible disturbance and negligible-low displacement effects, the Proposed Larger Turbines and Met Masts amendment will not cause adverse effects to the Slievefelim to Silvermines Mountain SPA;
- the Proposed Larger Turbines and Met Masts amendment will not result in any material changes to the impact of the authorised Upperchurch Windfarm on the Slievefelim to Silvermines Mountain SPA;
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Slievefelim to Silvermines Mountain SPA.

Special Conservation Interest:

- No effects on SCI species Hen Harrier [A082] via reductions in habitat, range, population status or viability, through permanent or temporary loss of foraging habitat.

Evaluations of the Other Elements of the Whole UWF Project – Disturbance/Displacement of foraging Hen Harrier during the breeding season

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: None, the UWF Related Works will be constructed outside of the Hen Harrier breeding season March to August inclusive (this includes hedgerow and scrub removal in addition to hedgerow trimming), therefore there is no potential for disturbance/displacement effects during the breeding season.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- Construction works for the UWF Related Works will be not be carried out during the Hen Harrier breeding season March to August inclusive;
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

UWF Grid Connection (authorised)

Impact Magnitude: During the breeding season, no works will be carried out within the SPA, and UWF Grid Connection works will be limited to the Mountphilips Substation site. No works will be carried out on the 110kV UGC outside of the Mountphilips Substation site during the breeding season. This means that all works during the breeding season, which will be limited to the Mountphilips Substation site, will take place at distances greater than 4.3km from any traditional nest sites which were recorded during the 2016, 2017 and 2019 breeding surveys.
Habitat surveys of lands within 2km of the known nest sites (2km is considered to be the core foraging area) demonstrate that there is ample suitable foraging habitat, which amounts to 3,580ha (or 42.9%) of the total land area (8,343ha) within the core foraging area around the 10 nests recorded in the upland area over the 2016 to 2019 period. In addition, according to Moran & Wilson-Parr (2015), there is 70% suitable habitat within the SPA as a whole. We therefore evaluate that there is no likelihood of Hen Harrier depending on the habitats within 150m of the construction works areas at Mountphilips Substation site, due to separation distance and the overall extent of habitat availability.
Taking into account that the nearest nest is 4.3km from the only part of the UWF Grid Connection which could be built during the breeding season – i.e. works at Mountphilips Substation site; with studies suggesting that most foraging occurs within 2km of a nest and reduces thereafter with distance; it is evaluated that the magnitude of any disturbance or displacement effects on foraging Hen Harrier during the breeding season will be negligible both within and outside the SPA, and with the application of project design measures (in particular GC-PD02 in relation to Mountphilips Substation site).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible (approximating to 'no change') magnitude;
- Works during the breeding season (March-August) will only take place at the Mountphilips Substation site. This means that no works will occur within 4.3km of any known nests, all of which are considered to be traditional nests, being used repeatedly;

- no likelihood of reliance on any suitable foraging habitats either at the Mountphilips Substation site due to separation distance from nests, and the large amount of suitable habitat (3,580ha) within the core foraging range (2km) of the Hen Harrier nests identified
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success, and;
- the availability of suitable foraging habitat within the wider area, with 70% suitable habitat available within the SPA;
- in the context of existing background trends and disturbance is primarily related to visual intrusion, and Hen Harrier is likely to already be habituated to road-based and farming-based noise and visual intrusion;
- Effects will be momentary-Brief in duration;
- unlikely to affect any individual >150m from source, and;
- Highly reversible once any individual moves beyond 150m.
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

UWF Replacement Forestry (licensed)

Impact Magnitude:
All planting will be done by hand and is located outside the SPA. Magnitude is negligible and unlikely to occur given the separation distance to the nearest nest (6.8km).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- No contrast in activities from background levels, and;
- Momentary – brief duration, with;
- High reversibility once any individual moves beyond 150m
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success.
- Works are to take place outside the SPA.
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

UWF Other Activities

Impact Magnitude: The Upperchurch Hen Harrier Scheme will involve activities with similar sources of noise/intrusion as farming practices; Haul Route Activities trimming will be similar to existing noise/intrusion from regular maintenance of roadside hedgerows, and works on the Killonan Line will compare with existing maintenance in terms of the scale and magnitude of any noise/intrusion. The magnitude of impact is evaluated as Negligible.

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:
- The location of activities outside the SPA
- No contrast from background levels of noise of intrusion is expected, and;
- Birds will already be habituated to road-based noise and visual intrusion;
- Effect duration will be brief to momentary for most activities, and;
- Highly reversible once any individual moves beyond 150m
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment)
– Disturbance/Displacement of foraging Hen Harrier during the breeding season

Due to an absence of impact sources in relation to construction and operational stage distubance, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination disturbance effect of all of the Elements as the Whole UWF Project on the European Site - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder. Potential for increased displacement impacts from operational turbines is addressed below:

Whole UWF Project Cumulative Impact Magnitude:
The spatial extent of the Whole UWF Project effect during the breeding season relates to the Mountphilips Substation site to the west of the upland area, outside the SPA and the Upperchurch Windfarm site on the eastern side of the

upland area, also outside the SPA. UWF Other Activities may also take place at both of these locations, in addition to other locations in the wider area (all of which will be outside, and at a distance from, the SPA). Works during the breeding season will include construction works at Upperchurch Windfarm (however no works will take place within 500m of a hen harrier nest) – all Upperchurch Windfarm works are located outside the SPA, and a substantial distance from the nearest Hen Harrier nests. Works during the breeding season may also include planting works for UWF Replacement Forestry – outside the SPA.No works for either the 110kV UGC (outside of the Mountphilips Substation site) or for the UWF Related Works will occur during the breeding season. Overall the magnitude of disturbance effects is evaluated as negligible.

Displacement effects only relates to the Upperchurch Windfarm element of the Whole UWF Project, as stated above, a 250m zone of displacement was examined for Upperchurch Windfarm in 2013, with a total of 101.27ha of suitable foraging habitat identified within this zone. While the proposed larger turbines represent a potential increase in disturbance magnitude, considering the infrequent Hen Harrier activity in the vicinity of the turbines, there is not expected to be any material change to disturbance/displacement to Hen Harrier as a result of the Proposed Larger Turbines and Met Masts, and the magnitude of displacement impacts is evaluated as low-negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Cumulative Impact Evaluation:

- Very High Sensitivity rating for Hen Harrier and negligible magnitude of impact;
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km
- no nests are within 4.3km of works during the breeding season;
- Very low probability of foraging birds occurring with sufficient frequency at MSS to result in significant consequences on nesting birds or breeding success, and;
- Separation distance between works at Mountphilips Substation site and works in the Upperchurch Windfarm area, both of which are outside the SPA;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.
- Construction works for the 110kV UGC (outside of Mountphilips Substation site) and for UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive, avoiding any potential for sequential effects with Other Elements or Other Projects;
- The distance to the nearest confirmed nest locations.
- In relation to displacement, the results of an extensive survey programme for Hen Harrier between 2015 and 2020 have shown that usage by Hen Harriers of the Upperchurch Windfarm site has remained consistent with levels of activity recorded during bird surveys for the authorised development between 2010 and 2012 – i.e. low levels of activity. Therefore given the low levels of Hen Harrier activity within the zone of influence of the proposed larger turbines and met masts, the potential for adverse effects resulting from operational stage dispacment is low and will not result in adverse effects on the integrity of the SPA.

Special Conservation Interest:

- No effects on SCI species Hen Harrier [A082] via reductions in habitat, range, population status or viability, through permanent or temporary loss of foraging habitat

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Disturbance/Displacement of foraging Hen Harrier during the breeding season

Due to an absence of impact sources in relation to construction/operational disturbance, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activites on the European Site - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder. Potential for cumulative displacement impacts as a result of operating turbines is addressed below:

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: There is potential for disturbance to breeding foraging hen harriers resulting from the Whole UWF Project, potential Bunkimalta and Castlewaller Windfarms Milestone Windfarm, Rearcross Quarry, Agriculture, Forestry in the surrounding area, and turf-cutting activities. Magnitude of effects from the Whole UWF Project is evaluated above as Negligible. When the Other Projects and Activities are collectively taken into account, the magnitude of effect will be negligible, due to the separation distances between the Whole UWF Project and these Other Projects, and due to the separation distance of Whole UWF Project works from the nearest nests.

In relation to cumulative displacement impacts, due to the separation distance between sources of operational displacement (i.e. Upperchurch Windfarm with the Castlewaller/Bunkimalta windfarms), and considering the low levels of harrier activity within the Upperchurch Windfarm and Milestone Windfarm sites, and the separation distance to the nearests nests from Upperchurch turbines (H1, 5.3km within the SPA, and Glenough 4km ex-situ the SPA), cumulative magnitude is evaluated as Negligible

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities:

No adverse effect on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Cumulative Impact Evaluation:

- Construction works for UWF Grid Connection during the breeding season limited to Mountphilips Substation site which puts works during the breeding season further than 4km from nest sites, avoiding any disturbance effects;
- Construction works for the 110kV UGC (outside of Mountphilips Substation site) and for UWF Related Works will be not be carried out during the Hen Harrier breeding season March to August inclusive, avoiding any potential for sequential effects;
- The distance to the nearest confirmed nest locations in respect of the UWF Grid Connection (Mountphilips Substation site – 4.3km) and consented Upperchurch Windfarm (5.3km from nearest turbine base), and UWF Replacement Forestry (6.8km from the afforestation lands);
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as traffic, farming practices, road maintenance, quarrying, forestry practices;
- The duration of effects, (momentary-brief);
- High reversibility once the individual bird moves beyond 150m; and
- The separation distance from UWF Grid Connection works at Mountphilips Substation site and Consented Upperchurch Windfarm from Castlewaller Windfarm site or Bunkimalta Windfarm site (both greater than 4km) precludes sequential effects.
- The separation distance between Upperchurch turbines and Castlewaller/Bunkimalta turbines;.
- the low levels of harrier activity within the Upperchurch Windfarm
- requirement on projects within a designated site to prove that no significant adverse effects will occur
- No increase in operations at Rearcross Quarry are expected;

Other Projects

- The presence of low value habitats for Hen Harrier at Milestone Windfarm; the location of the Milestone Windfarm outside the SPA, and the implementation of a Hen Harrier Management Plan to mitigate for any disturbance effects such as displacement from foraging areas;
- The extent of displacement habitat available for any disturbed/displaced birds at Castlewaller Windfarm, in the context of the requirement for demonstration of no adverse effects on Hen Harrier for this project;
- Any future proposals for Bunkimalta Windfarm will be required to prove that adverse effects on European site integrity are avoided, including due to the permanent exclusion of Hen Harrier from suitable habitat – including from disturbance/displacement;
- No contrast of Rearcross Quarry activities from background levels, with the reversibility of any disturbance as individual hen harriers move beyond 150m from works, in the context of the provision of displacement habitat (10ha) as part of the quarry's planning conditions;
- Forestry, agricultural and turf-cutting activities are not expected to contrast with background levels.
- Forestry activities (such as felling) will be subject to Appropriate Assessment.
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

6.9.3.1.4 Effects on SCI species along Pathways 1 & 4 from Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Impact Description: Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Project Life Cycle Stage: Construction stage/Operational Stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: Visual intrusion resulting from the presence and operation of the proposed larger turbines and met masts

Whole UWF Project Impact Source: noise and visual intrusion; operating machinery; presence of construction personnel, operating wind turbines

Other Unrelated Project/Activity Cumulative Impact Source: noise and visual intrusion; operating machinery; presence people associated with farming and forestry management activities, turf-cutting, quarrying works and *potentially* other windfarm construction sites, operating turbines.

Impact Pathway: Air, Visibility

Impact Description: Behavioural avoidance of operational wind turbines in hen harriers results in birds being displaced from suitable habitat in the vicinity of turbines; this has been documented in a number of studies (Wilson et al., 2015).

Between the period September to February inclusive, Hen Harriers are considered to be in their non-breeding season (Watson, 1977). During the non-breeding season, Hen Harriers may move substantial distances from their breeding areas, including immigration into Ireland from the UK (Wernham *et al.*, 2002; Etheridge & Summers, 2006), as well as movements within Ireland (Irwin *et al.*, 2011). This reduces reliance on habitats proximal to breeding areas, with Hen Harriers making substantial movements during the non-breeding season, which indicates that Harriers are less likely to be sensitive to disturbance during the non-breeding season compared to during the nesting season (when Hen Harriers are typically limited to foraging with 2km of nesting locations (Arroyo *et al.*, 2014) with studies suggesting that most foraging occurs within 2km of a nest and reduces thereafter with distance). In addition, the effects of disturbance in the non-breeding season are at an individual level rather than affecting chicks/nest success. As the SPA is of ornithological importance for breeding birds, this results in less likelihood of secondary effects which may impact on favourable conservation condition, however some cognisance is given to the (possible) presence of non-breeding birds from the SPA during the winter months.

There are two potential impacts from disturbance during the non-breeding season:

- disturbance/displacement when foraging; and
- disturbance to birds at their night-time roosts (Gilbert *et al*., 2011), which has been excluded as no significant effects are reasonably foreseeable due to distance between Upperchurch Windfarm/UWF Related Works/UWF Grid Connection works and identified roost sites. The selective timing of works as part of Project Design in proximity to roosts will avoid disturbance to birds commuting to communal roosts sites.

This impact table addresses the potential for disturbance/displacement to Hen Harrier when foraging.

A minimum approach distance (MAD) as a function of flight initiation distance (FID) is used to determine the likelihood of any effect on an individual. There have been no specific studies examining the FID of foraging Hen Harriers to human disturbance. However, a study on FIDs on Northern Harrier *Circus cyaneus* from aircraft suggested a mean FID of 70m (Booms *et al.,* 2010) implying that birds may react to disturbance of similar magnitude (90db) at a distance of 105m. In a wider review of FIDs, Livesey et al. (2016) indicated a mean FIDs for Falconiformes of 89.7m (MAD 134.5m) (for pedestrian-based disturbance) and 79.7m (MAD 119.5m) (for motorised vehicles). Collectively, these data would suggest that foraging Hen Harriers are unlikely to be impacted by disturbance events over 150m away. Hen Harrier will also be habituated to certain background activities such as traffic and machinery on roads and on farmlands and would be expected to react less to artificial noise than to the presence of humans. In the winter months, when birds are more nomadic, less reliance is naturally placed on specific locations, thus reduced potential for sequential effects exists.
Therefore, construction works and the presence of construction personnel are unlikely to result in any noticeable effect on foraging Hen Harriers more than 150m away from the point of disturbance. A 150m buffer of the proposed development is taken as the zone wherein effective habitat loss may take place following disturbance through noise or visual intrusion, should suitable foraging habitat be present within this radius of works.

In relation to cumulative (sequential) effects, multiple sources of noise and visual intrusion occurring within the same spatial and/or temporal timeframe may combine should Hen Harriers encounter multiple sources of disturbance displacement in succession.

Impact Quality: Negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Authorised Upperchurch Windfarm

Impact Magnitude:

Upperchurch Windfarm is located entirely outside the SPA.

Out of 504 ha within the footprint and 150m of the consented Upperchurch Windfarm, only 135 ha (27%) is suitable for Hen Harriers to forage. Data from field surveys also indicate very low levels of Hen Harrier use within the footprint of the consented Upperchurch Windfarm (in 2 years of additionally commissioned Hen Harrier surveys carried out from March 2015 to April 2017, a representative sample of 379 hours of winter season (Oct-March inclusive) VP observations yielded a total of 600 seconds of observed Hen Harrier activity, (of which 240 seconds were within 150m of works locations (Ecopower Developments 2015, 2016 and 2017). Due to the low proportion of suitable habitat at the windfarm site, the low numbers of Hen Harrier recorded during the winter season, and the availability of suitable habitat in the wider landscape (36% within 2km, 70% within the SPA), it is considered that the magnitude of construction or operational stage disturbance will be negligible.

In relation to displacement from operational turbines, a zone of displacement of 250m around each Upperchurch turbine was examined in the 2013 EIS in response to RFI from Tipperary County Council. A total of 101.27ha of suitable foraging habitat was identified within the 250m displacement zone (*based on a construction year of 2022*). The 250m displacement zone does not overlap the SPA boundary. The randomness and low number of hen harrier observations during the vantage point surveys in 2010 and 2011 *(and during surveys in between 2015 and 2020)* demonstrates that Upperchurch is used infrequently by hen harriers. The very low number of observations would suggest that the magnitude of displacement from the authorised turibnes would be negligible.

The amendments to the windfarm substation (approved in December 2020) do not change works locations, levels of activity or personnel associated with the Upperchurch Windfarm (as evaluated in 2013).

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- Upperchurch Windfarm is outside the SPA;
- Very High sensitivity of the species and Negligible Magnitude,
- Low levels of recorded Hen Harrier activity during the winter;
- The low proportion (<30%) of suitable habitat for foraging Hen Harriers in the footprint and 150m buffer of the consented Upperchurch Windfarm; coupled with
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.
- Availability of foraging habitats for Hen Harrier within the wider area (1,846ha (36%) within 2km of the Consented Upperchurch Windfarm and 70% suitable habitat within the SPA as a whole).
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success subsequently
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude:

No sources of disturbance as a result of construction or operational works/acitivities or presence of personnel associated with Proposed Amendment.

The source of displacement effects relates only to an increased turbine size. Behavioural avoidance of operational wind turbines in hen harriers results in birds being displaced from suitable habitat in the vicinity of turbines; this has been documented in a number of studies (Wilson et al., 2015). The results of an extensive survey programme for Hen Harrier covering the Upperchurch Windfarm, UWF Related Works and UWF Grid Connection carried out between 2015 and 2020 have shown that usage by Hen Harriers of the Upperchurch Windfarm site has remained consistent with levels of activity recorded during bird surveys for the authorised development between 2010 and 2012 – i.e. low levels of activity. In addition, the baseline environment in terms of the 'sub-optimal' availability of suitable habitat for Hen Harrier has remained stable, a fact that is reflected in the continued low levels of Hen Harrier flight activity observed within the study site. While the larger turbines represent a potential increase in disturbance magnitude, considering the infrequent Hen Harrier activity in the vicinity of the turbines, there is not expected to be any material change to disturbance/displacement to Hen Harrier as a result of the Proposed Larger Turbines and Met Masts, and the magnitude of displacement impacts during the non-breeding season is evaluated as negligible.

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

No adverse effects are associated with the Proposed Larger Turbines and Met Masts amendment because:

- The amendment only relates to the turbine and met mast structures, the proposed amendments to the authorised turbines and met masts will not result in any changes to construction/operational activity (including use of machinery) or to works locations or to numbers of personnel associated with the authorised windfarm – no sources of disturbance associated with the proposed larger turbine or met mast structures,
- The results of an extensive survey programme for Hen Harrier between 2015 and 2020 have shown that usage by Hen Harriers of the Upperchurch Windfarm site has remained consistent with levels of activity recorded during bird surveys for the authorised development between 2010 and 2012 – i.e. low levels of activity. Therefore given the low levels of Hen Harrier activity within the zone of influence of the proposed larger turbines and met masts, the potential for adverse effects resulting from operational stage dispacement is low and will not result in adverse effects on the integrity of the SPA.
- The baseline environment in terms of the 'sub-optimal' availability of suitable foraging habitat for Hen Harrier has remained stable, a fact that is reflected in the continued low levels of Hen Harrier flight activity observed within the study site.
- Taking into consideration negligible disturbance or displacement effects, the Proposed Larger Turbines and Met Masts amendment will not cause adverse effects to the Slievefelim to Silvermines Mountain SPA;
- the Proposed Larger Turbines and Met Masts amendment will not result in any material changes to the impact of the authorised Upperchurch Windfarm on the Slievefelim to Silvermines Mountain SPA;
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Slievefelim to Silvermines Mountain SPA.

Special Conservation Interest:

- No effects on SCI species Hen Harrier [A082] via reductions in habitat, range, population status or viability, through permanent or temporary loss of foraging habitat.

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

Evaluations of the Other Elements of the Whole UWF Project – Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude:
Likely noise levels from construction are evaluated as negligible in the context of existing background trends and disturbance is primarily related to visual intrusion.

UWF Related Works will be constructed during the September to February period; disturbance/displacement impacts to foraging Hen Harrier could therefore occur during this time. Although part of the UWF Related Works site overlaps the SPA (at HW7), all works locations are outside the SPA.

Habitat surveys of lands within 150m of the UWF Related Works (150m is considered to be the distance from the disturbance/displacement where impacts on foraging Hen Harrier could occur) indicate that there is potentially 152ha (27%) of foraging habitats where Hen Harriers could be disturbed. However, this forms a very small proportion of the available suitable foraging habitat in the wider landscape. A similar calculation on habitat availability within 2km of the UWF Related Works indicates that there are some 2,050 ha (38%) of suitable habitats within 2km and, according to Moran & Wilson-Parr (2015), there is 70% suitable habitat within the SPA as a whole. We therefore evaluate that there is no likelihood/probability of wintering Hen Harrier depending on the habitats within 150m of the UWF Related Works due to the overall extent of habitat availability.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible magnitude;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.
- Availability of foraging habitats within the wider area (2,050ha (38%) within 2km of the UWF Related Works and 70% suitable habitat within the SPA as a whole).
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success subsequently
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

UWF Grid Connection (authorised)

Impact Magnitude:
Winter hunting grounds cover a much wider range and greater variety of habitats than Summer (Watson, 1977).
Based on studies conducted for the previous planning application (PL92 .301959) the winter population of the UWF Grid Connection study area is estimated as 0-5 birds (based on a maximum of 5 birds recorded concurrently (for the 2018 application) across all roosts on any given day, from 2 winter seasons of effort). This has the potential to increase or decrease dependant on inter-annual variation, weather or other factors. Likely noise levels from construction are evaluated as negligible in the context of existing background trends and disturbance is primarily related to visual intrusion.
Habitat surveys of lands within 150m of the UWF Grid Connection works (150m is considered to be the distance from construction works where disturbance/displacement could occur) indicate that there is potentially 345ha (36%) of foraging habitats where Hen Harriers could be disturbed, which overlap authorised works during the winter period (this would only represent a maximum disturbance should all works be taking place concurrently). Furthermore, this area forms a very small proportion of the available suitable foraging habitat in the wider landscape. For example, a similar calculation on habitat availability for foraging Hen Harriers within 2km of the UWF Grid Connection works indicates that there are some 4,842 ha (39%) of suitable habitats and, according to Moran & Wilson-Parr (2015), there

is 70% suitable habitat (ca. 14,642Ha) within the wider SPA as a whole. On this basis there is no likelihood / probability of Hen Harrier exclusively depending on the habitats within 150m of the UWF Grid Connection works during the winter months, thus reducing any likelihood of significant effects.
Due to the linear nature of the 110kV UGC, disturbance and effective habitat loss through disturbance/displacement would be brief to temporary in nature, whereas any disturbance/displacement from works at the Mountphilips Substation site will be temporary in nature.
UWF Grid Connection works during the non-breeding season relates to all works areas for UWF Grid Connection, i.e. the Mountphilips Substation site and the 110kV UGC works, which are predominantly on public roads between the Mountphilips Substation site and the Consented Upperchurch Windfarm Substation compound. 110kV UGC works on the public road network include works on the Regional Road R503, which is located within the boundary of the SPA. To reiterate, as per Project Design, no works will take place outside of the Mountphilips Substation site during the Hen Harrier breeding season, this means that any works within the SPA boundary will only be carried out during the non-breeding season. Overall, the Magnitude of disturbance/displacement is evaluated as being negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- Very High sensitivity rating for Hen Harrier and Negligible magnitude;
- Birds will already be habituated to road-based noise and visual intrusion;
- Effects will be momentary-brief in duration;
- unlikely to affect any individual >150m from source; and
- Highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available;
- Demonstrated low numbers of Hen Harriers wintering in the vicinity.
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success subsequently;
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

UWF Replacement Forestry (licensed)

Impact Magnitude:
All planting will be done by hand, and is outside the SPA. Magnitude is negligible.

Significance of the Impact: No adverse effect on European Site Integrity

Rationale for Impact Evaluation:
- No contrast in activities from background levels, and;
- Momentary – brief duration, with;
- High reversibility once any individual moves beyond 150m.
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success subsequently
- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

UWF Other Activities

Impact Magnitude:
The Upperchurch Hen Harrier Scheme will involve activities with similar sources of noise/intrusion as farming practices; Haul Route Activities trimming will be similar to existing noise/intrusion from regular maintenance of roadside boundaries and works on the Killonan Line will compare with existing maintenance in terms of the scale and magnitude of any noise/intrusion. All occur outside the SPA.
The magnitude of impact is evaluated as Negligible.

Significance of the Impact: No adverse effects on European Site Integrity.

Rationale for Impact Evaluation:
- Activity locations are outside the SPA;
- No contrast from background levels of noise of intrusion is expected, and;
- Wintering Hen Harriers will already be habituated to road-based noise and visual intrusion;
- Overhead Line Activities will compare to existing maintenance activities;
- Effect duration will be brief to momentary for most activities, and;
- Highly reversible once any individual moves beyond 150m.

- Favorable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment)
– Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Due to an absence of impact sources in relation to construction and operational stage distubance, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination disturbance effect of all of the Elements as the Whole UWF Project on the European Site - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder. Potential for increased displacement impacts from operational turbines is addressed below:

Whole UWF Project Cumulative Impact Magnitude:

In relation to cumulative effects, multiple sources of noise and visual intrusion will occur in and on both sides of the upland area, during the same period of time. The 110kV UGC works in the Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola townlands area will be carried out during the same period as UWF Related Works and Upperchurch Windfarm construction works.

Habitat surveys of lands within 150m of the construction works (150m is considered to be the distance from construction works where disturbance/displacement could occur) indicate that there is potentially 345ha of foraging habitats where Hen Harriers could be disturbed within 150m of UWF Grid Connection works; and 480ha of foraging habitats where Hen Harriers could be disturbed within 150m of UWF Related Works/Upperchurch Windfarm works, during the winter period (this would only represent a maximum disturbance should all works be taking place concurrently).

These works will be spread over a wide linear area from the Mountphilips Substation site on the western side of the upland area, along public roads through the upland area, and on lands on the eastern side of the upland area. Furthermore, the lands within 150m of construction works form a very small proportion of the available suitable foraging habitat in the wider landscape. The Mountphilips Substation site contains only a small area of suitable foraging habitat with the site generally under improved grassland. No disturbance effects are anticipated for construction at the Upperchurch Windfarm/UWF Related Works area during the winter months due to low numbers of Harriers recorded within the greater area. Overall, the Magnitude of cumulative disturbance/displacement is therefore evaluated as being negligible.

While the 110kV UGC works in the Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola townlands area will be carried out during the same period as UWF Related Works and Upperchurch Windfarm construction works. The magnitude of impact is reduced through the application of project design (which was developed for the protection of residential amenity, but also will reduce the magnitude of cumulative or sequential effects to hen harrier): GC-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 Upperchurch Windfarm Turbines along these local roads; and GC-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. In respect of UWF Replacement Forestry, all planting will be done by hand. UWF Other Activities will be small in scale and similar to background farming activities. The Magnitude of both of these activities will be negligible.

Displacement effects only relates to the Upperchurch Windfarm element of the Whole UWF Project, as stated above, a 250m zone of displacement was examined for Upperchurch Windfarm in 2013, with a total of 101.27ha of suitable foraging habitat identified within this zone. While the proposed larger turbines represent a potential increase in disturbance magnitude, considering the infrequent Hen Harrier activity in the vicinity of the turbines, there is not expected to be any material change to disturbance/displacement to Hen Harrier as a result of the Proposed Larger Turbines and Met Masts, and the magnitude of displacement impacts is evaluated as negligible.

Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment):

No adverse effects on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Impact Evaluation:

- Very High sensitivity rating for Hen Harrier and Negligible magnitude;
- Birds will already be habituated to road-based noise and visual intrusion;
- Effects will be momentary-brief in duration;
- unlikely to affect any individual >150m from source; and
- Highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available; and

- Demonstrated low numbers of Hen Harriers wintering in the vicinity;
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success subsequently.
- In relation to displacement, the results of an extensive survey programme for Hen Harrier between 2015 and 2020 have shown that usage by Hen Harriers of the Upperchurch Windfarm site has remained consistent with levels of activity recorded during bird surveys for the authorised development between 2010 and 2012 – i.e. low levels of activity. Therefore given the low levels of Hen Harrier activity within the zone of influence of the proposed larger turbines and met masts, the potential for adverse effects resulting from operational stage dispacment is low and will not result in adverse effects on the integrity of the SPA.

Special Conservation Interest:

- No effects on SCI species Hen Harrier [A082] via reductions in habitat, range, population status or viability, through permanent or temporary loss of foraging habitat

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Disturbance/Displacement of foraging Hen Harrier outside of the breeding season

Due to an absence of impact sources in relation to construction/operational disturbance, the Proposed Larger Turbines & Met Masts amendement will not change the in-combination effect of the Whole UWF Project with other unrelated projects or activites on the European Site - beyond that already evaluated in the most recent AA Report – UWF Grid Connection, December 2019, and reproduced hereunder. Potential for cumulative displacement impacts as a result of operating turbines is addressed below:

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude:

The magnitude of foraging habitat loss resulting from the Whole UWF Project, consented Castlewaller Windfarm and potential grid connection, potential Bunkimalta Windfarm and consented grid connection, existing Milestone Windfarm, Quarries, Agriculture and turf cutting in the vicinity are evaluated as being negligible. Forestry activities in the surrounding area is generally a negative trend in the background environment currently with declines in available foraging habitat in the short-medium term (next 10 years & expected to increase subsequently) and evaluated of Medium magnitude in that regard. No turf cutting is likely to take place during winter months and agriculture is likely to be the same as existing baseline. There is some potential for birds to encounter sources of noise or visual intrusion sequentially as they move through the landscape.

In relation to cumulative displacement impacts, due to the separation distance between sources of operational displacement (i.e. Upperchurch Windfarm with the Castlewaller/Bunkimalta windfarms), and considering the low levels of harrier activity within the Upperchurch Windfarm and Milestone Windfarm sites, cumulative magnitude is evaluated as Negligible

Overall magnitude is evaluated as negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities:

No adverse effect on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Cumulative Evaluation:

- Very High sensitivity rating for Hen Harrier, and Negligible magnitude;
- The potential for sequential events, however;
- Wintering Harriers are likely to be habituated to various background activities such as once-off housing, farming practices, road maintenance, forestry practices and;
- Effects will be momentary-brief in duration;
- unlikely to affect any individual >150m from source; and
- Highly reversible once any individual moves beyond 150m, given the extent of suitable foraging habitats available;
- Demonstrated low numbers of Hen Harriers wintering in the vicinity;
- The separation distance between Upperchurch turbines and Castlewaller/Bunkimalta turbines;.
- the low levels of harrier activity within the Upperchurch Windfarm
- Very low probability of foraging birds occurring with sufficient frequency to result in significant consequences on nesting birds or breeding success subsequently

Other Projects

- Milestone windfarm has already been constructed (with 2 permitted turbines not built) and is located outside the SPA, and therefore wintering Hen Harriers will already be habituated to ambient noise and visual intrusion; the implementation of a Hen Harrier Management Plan to mitigate for any operational disturbance effects such as displacement from foraging areas; in the context of the presence of low value habitats for Hen Harrier at Milestone Windfarm in the first instance, as reported
- The potential for interaction of hen harrier with Castlewaller Windfarm works during the winter months, notwithstanding, wintering Hen Harriers will already be habituated to ambient noise and visual intrusion, and may not even be birds connected to the SPA; and in the context of the extent of displacement habitat available for any disturbed birds; Any grid connection route, which may be proposed at a future date, will be required to show no significant effects to Hen Harrier included through disturbance related pathways
- The consented grid connection is routed along forestry roads and public roads where it occurs within the SPA. Any future proposed Bunkimalta Windfarm will have proven that impacts to Hen Harrier will not be significant (in the context of its location within a Hen Harrier SPA), this is likely to include measures in relation to disturbance and displacement, particularly from suitable habitat
- The operation of Rearcross Quarry will be effectively same as background. No potential for secondary impacts as there the quarry will be able to supply all aggregate to the Whole UWF Project within the current consented capacity of the quarry
- Agricultural activities will not contrast with background levels; and any disturbance will be highly reversible once any individual moves beyond 150m
- The limited extent of lands subject to turbary (rights to cut turf) within the Hen Harrier SPA overall (4%), with little of this occurring within the Cumulative Evaluation study areas or likely to occur in winter;
- Favourable Conservation condition of the species, will not be impacted through any reduction in habitat, range, population status or viability through disturbance or exclusion effects.

6.9.3.1.5 Effects on SCI species along Pathways 1 & 4 from Collision risk with operating turbines

Impact Description

Project Life Cycle Stage: Operational Stage

Proposed Larger Turbines & Met Masts Amendment Impact Sources: operating wind turbines

Whole UWF Project Impact Source: operating wind turbines
Other Unrelated Project/Activity Cumulative Impact Source: operating wind turbines
Impact Pathway: direct contact
Impact Description: While there are recorded incidences of mortality of Hen Harriers due to wind turbine collision (Drewitt & Langston, 2008, Bellebaum et al., 2013, Erickson et al., 2014), Hen Harriers have been shown to be less susceptible than other bird of prey species to collision with operational wind turbines. This is attributable to the flight habitat of this species, which typically fly at heights of less than 25m, below the height of rotor blade swept area (Smallwood & Thelander, 2004, Drewitt & Langston, 2006)..

Impact Quality: negative

Evaluations of Upperchurch Windfarm and the Proposed Larger Turbines and Met Masts Amendment – Collision Risk with Operating Turbines

Authorised Upperchurch Windfarm

Impact Magnitude:

Upperchurch Windfarm is located outside the SPA. The results of the surveys carried out for the 2013 EIS, and the results of subsequent surveys of the Upperchurch Windfarm study area have shown infrequent and sporadic usage of the Upperchurch Windfarm site by Hen harriers during both the breeding and winter seasons. Across all surveys of the Upperchurch Windfarm site there has been a total of 9 observations of Hen Harriers resulting from 642 hours of vantage point survey effort. Given the typically low flight heights of Hen Harriers and documented avoidance behaviour (Chamberlain et al., 2006; Garvin et al., 2011; Higgins et al., 2007; Larsen & Guillemette, 2007), in relation to wind turbines, collision risk for Hen Harriers is considered to be low (Whitfield & Madders, 2006). Of the seven observations of Hen harrier recorded during the 2019 and 2020 vantage point surveys, three were within the Upperchurch Windfarm 2013 study area; of these three observations only one was recorded flying within the rotor swept area, this was for a period of 10 seconds. While hen harriers are potentially more vulnerable to collision during display flights (Wilson et al., 2015), the separation distance from the nearest known traditional nest sites (nearest site 4km to south at Glenough) makes the occurrence of courtship flights at the Upperchurch Windfarm site unlikely to occur – all of the authorised Upperchurch turbines are located beyond the core foraging range (2km) from known traditional nest sites. This is reflected by the survey results wherein all observations of Hen harriers were of lone birds either foraging or in commuting flight.

Considering the above, the impact magnitude resulting from the Proposed Larger Turbines and Met Masts amendment is evaluated to be negligible.

The amendments to the windfarm substation (approved in December 2020) does not include moving structures and therefore do not present a collision risk to Hen Harrier. .

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- Due to the low abundance and low levels of flight activity for Hen Harriers observed within the Upperchurch Windfarm site during field surveys.
- The separation distance between the nearest known Hen Harrier nest sites and the Upperchurch Windfarm.
- The documented avoidance behavior of Hen Harriers towards wind turbines.
- Given the typically low flight heights of Hen Harriers and documented avoidance behaviour (Chamberlain et al. 2006; Garvin et al. 2011; Higgins et al. 2007; Larsen & Guillemette, 2007), in relation to wind turbines, collision risk for Hen Harriers is considered to be low (Whitfield & Madders, 2006).
- Favorable Conservation condition of the species, will not be impacted through any reduction in population status or viability through mortality effects.

Proposed Larger Turbines and Met Masts Amendment to the authorised Upperchurch Windfarm

Impact Magnitude:
Given the typically low flight heights of Hen Harriers and documented avoidance behaviour (Chamberlain et al., 2006; Garvin et al., 2011; Higgins et al., 2007; Larsen & Guillemette, 2007), in relation to wind turbines, collision risk for Hen Harriers is considered to be low (Whitfield & Madders, 2006). While the larger turbines represent a potential increase in collision risk, considering the infrequent Hen Harrier activity in the vicinity of the turbines, separation distance from known traditional nest sites, and sub-optimal habitat at the windfarm site, the impact magnitude resulting from the Proposed Larger Turbines and Met Masts amendment is evaluated to be Negligible. Given that the Proposed Larger Met Mast will comprise of stationary structures, no impacts to Hen Harriers resulting from collision are anticipated.

Significance of the Impact: No adverse effects on European Site Integrity

Rationale for Impact Evaluation:

- Given the typically low flight heights of Hen Harriers and documented avoidance behaviour (Chamberlain et al. 2006; Garvin et al. 2011; Higgins et al. 2007; Larsen & Guillemette, 2007), in relation to wind turbines, collision risk for Hen Harriers is considered to be low (Whitfield & Madders, 2006).
- While hen harriers are potentially more vulnerable to collision during display flights (Wilson et al. 2015), the separation distance from the nearest known traditional nest sites (nearest site 4km to south at Glenough) makes the occurrence of courtship flights at the Upperchurch Windfarm site unlikely to occur – all of the Proposed Larger Turbines are located beyond the core foraging range (2km) from known traditional nest sites.
- Continued infrequent and sporadic usage of the Upperchurch Windfarm site by Hen Harriers during the breeding season as evidenced by the 2019 & 2020 VP surveys;
- No recorded winter roosts within 2km of the Upperchurch Windfarm;
- No material change to the habitat suitability within the site which remains as 'sub-optimal';
- No change to the location of turbines and met masts from the authorised locations;
- Considering the above points in the context of the increased turbine size, the change to the collision risk for Hen Harrier resulting from the proposed larger turbines will be negligible, with no material increase in collision impact significance;
- Due to negligible impact magnitude, the Proposed Larger Turbines and Met Masts amendment will not cause adverse effects to the Slievefelim to Silvermines Mountain SPA;
- the Proposed Larger Turbines and Met Masts amendment will not result in any material changes to the impact of the authorised Upperchurch Windfarm on the Slievefelim to Silvermines Mountain SPA;
- the Upperchurch Windfarm, including the Proposed Larger Turbines & Met Masts amendment will not cause adverse effects to the integrity of the Slievefelim to Silvermines Mountain SPA.

Special Conservation Interest:

- No effects on SCI species Hen Harrier [A082] via reductions in habitat, range, population status or viability, through permanent or temporary loss of foraging habitat.

Evaluations of the Other Elements of the Whole UWF Project – Collision Risk with operating turbines

The Proposed Larger Turbines & Met Masts amendment will not result in any changes to the Other Elements and will not change the impact of the Other Elements on the European Site (beyond that already evaluated in the most recent AA Report – Appropriate Assessment Reporting for UWF Grid Connection, December 2019.
Notwithstanding, the individual effect of the remaining Elements and the in-combination effect of the Whole UWF Project is reproduced below (from 2019) to facilitate the Planning Authority to fully assess in-combination effects of the Whole UWF Project. It is confirmed that there have been no material changes in the environment since 2019, and therefore it is considered that the 2019 evaluations remain relevant to the 2021 evaluation here.

UWF Related Works (authorised)

Impact Magnitude: Collision risk with the Telecoms Relay Pole is evaluated as negligible.

Significance of the Impact: Not adverse effects on European Site Integrity
Rationale for Impact Evaluation: ● The very high sensitivity of the species and negligible magnitude; ● Separation distance from nearest known nests; ● Favourable Conservation condition of the species, will not be impacted through the presence of the Telecoms Relay Pole.
UWF Grid Connection (authorised)
Impact Magnitude: Collision risk with Mountphilips Substation is evaluated as negligible.
Significance of the Impact: No adverse effect on European Site Integrity
Rationale for Impact Evaluation: ● The very high sensitivity of the species and negligible magnitude; ● Separation distance from nearest known nests; ● Favourable Conservation condition of the species, will not be impacted through the presence of Mountphilips Substation.
UWF Replacement Forestry (licensed)
Impact Magnitude: None – trees do not present collision risk
Significance of the Impact: No adverse effect on European Site Integrity
Rationale for Impact Evaluation: ● The very high sensitivity of the species and negligible magnitude; ● Separation distance from nearest known nests; ● Favourable Conservation condition of the species, will not be adversely impacted
UWF Other Activities
Impact Magnitude: None – trees do not present collision risk
Significance of the Impact: No adverse effects on European Site Integrity
Rationale for Impact Evaluation: ● The very high sensitivity of the species and negligible magnitude; ● Separation distance from nearest known nests; Favourable Conservation condition of the species, will not be adversely impacted.
Evaluation of the effect of the Whole UWF Project (including the Proposed Amendment) – Collision Risk with Operating Turbines
The Whole UWF Project Impact relating to mortality impacts to Hen Harrier as a result of collision with turbine blades is addressed below. Whole UWF Project Cumulative Impact Magnitude: Collision risk with operating turbines within the Whole UWF Project (including Proposed Amendment) is evaluated as negligible (due to low levels of Hen Harrier activity with the Upperchurch Windfarm site, flight behaviour of this species, and documented avoidance behaviour of wind turbines).The larger turbines of the proposed amendment have been evlauted to result in a negligible impact with regard to collision risk – as there are no additional sources of collision risk to this SCI in relation to all other elements of the Whole UWF project, the whole project impact magnitude remains as negligible.
Significance of the Whole UWF Project Impact (including the Proposed Larger Turbines & Met Masts amendment): **No adverse effects on the Integrity of the Slievefelim to Silvermines Mountain SPA**
Rationale for Impact Evaluation: ● The very high sensitivity of the species and negligible magnitude; ● Due to the low abundance and low levels of flight activity of Hen Harriers observed within the Upperchurch Windfarm site during field surveys. ● Favourable Conservation condition of the species, will not be impacted by operational turbines (either consented or proposed larger turbines). ● The separation distance between the nearest known Hen Harrier nest sites and the Upperchurch Windfarm. ● The documented avoidance behavior of Hen Harriers towards wind turbines.

- Given the typically low flight heights of Hen Harriers and documented avoidance behaviour (Chamberlain et al. 2006; Garvin et al. 2011; Higgins et al. 2007; Larsen & Guillemette, 2007), in relation to wind turbines, collision risk for Hen Harriers is considered to be low (Whitfield & Madders, 2006).

Special Conservation Interest:

- No effects on SCI species Hen Harrier [A082] via reductions in habitat, range, population status or viability, through permanent or temporary loss of foraging habitat

Evaluation of the effect of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) with Other Unrelated Projects & Activities

– Collision Risk with Operating Turbines

The potential for cumulative mortality impacts to Hen Harrier as a result of collision with turbine blades from both Upperchurch Windfarm and other windfarms is addressed below:

Whole UWF Project + Other Projects/Activities Cumulative Impact Magnitude: Collision risk with operating turbines within the Whole UWF with Other Unrelated Projects (Bunkimalta Castlewaller and Milestone Windfarms) is evaluated as negligable due to low levels of Hen Harrier activity within the Upperchurch Windfarm site, flight behaviour of this species, and documented avoidance behaviour of wind turbines). The larger turbines of the proposed amendment have been evlauted to result in a negligible impact with regard to collision risk to hen harriers and therefore the cumulative impact magnitude with other unrelated projects is anticipated to remain at negligible.

Significance of the Whole UWF Project (including the Proposed Larger Turbines & Met Masts amendment) Impact in-combination with Other Unrelated Activities:

No adverse effect on the Integrity of the Slievefelim to Silvermines Mountain SPA

Rationale for Cumulative Impact Evaluation:

- The very high sensitivity of the species and negligible magnitude;
- Separation distance from nearest known nests;
- Due to the low abundance of Hen Harriers observed within the Upperchurch Windfarm site during field surveys.

Other projects

- Seperation distance of Upperchurch Windfarm from Bunkimalta Windfarm and Castlewaller Windfarm;
- Hen Harrier surveys for the Milestone Windfarm (Biosphere Environmental Services, 2015, 2017) have shown low levels of Hen Harrier activity with no evidence of nesting or behaviour indicative of breeding in the vicinity of the Milestone Windfarm. Given the low levels of Hen Harrier activity recorded for the Milestone Windfarm site, which is consistent with the low levels of activity for the Upperchurch Windfarm site, the potential for cumulative impacts to arise as a result of the proposed larger turbines and met masts is unlikely to result in a significant cumulative with the Milestone Windfarm. The nature of the habitats present at the Milestone Windfarm, which are consistent with the adjoining Upperchurch Windfarm site, are generally also of low suitability for Hen Harrier
- The documented avoidance behavior of Hen Harriers towards wind turbines.

6.9.4 Summary of the Impact of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts Amendment) on Qualifying Interests of the Slievefelim to Silvermines Mountain SPA

This section *(Section 6.9)* of the NIS has provided further evaluation of the source-impact pathways identified at Stage 1 Screening (see Section 5.5.4) as having the potential to result in likely significant effects on the Slievefelim to Silvermines Mountain SPA and its respective Special Conservation Interest screened in for further appraisal.

The Special Conservation Interest screened in for evaluation at Stage 2 were:

- Hen Harrier [A082]

The above Special Conservation Interest species has been subject to further examination in respect of its specific sensitivities & Conservation Objectives as to whether the identified pathways/effects can be considered likely to result in adverse effects on European Site Integrity via effects on Conservation Objectives; and it is concluded that:

- The favorable Conservation condition of the species, or the Integrity of the Slievefelim to Silvermines Mountain SPA, will not be adversely affected through any reduction in habitat, range, population status, dynamics or viability, through permanent or temporary loss of habitat, disturbance or displacement during either the breeding or non-breeding seasons, and any reductions in prey item density.

Cognisance has been given at this stage to the various Mitigation Measures (see Section 6.5.2) designed to specifically avoid adverse effects on European Site Integrity, and in-combination effects with both other project elements of the Whole Upperchurch Windfarm Project in addition to other plans, projects or activities, within the defined temporal and spatial overlap for cumulative or in combination effects. Effects both within and without (i.e. ex-situ) the Slievefelim to Silvermines Mountain SPA have been considered.

Table 6-27, overleaf in Section 6.9.5 summarises the evaluation of the impact of Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities on the Integrity of the Slievefelim to Silvermines Mountain SPA.

6.9.5 Evaluation of the impact of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts) on the Integrity of the Slievefelim to Silvermines Mountain SPA

Using the checklist in the Table below, the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities is examined, bfor adverse impacts on the integrity of the Slievefelim to Silvermines Mountain SPA.

Table 6-27: Integrity of Site checklist

Does the project or plan have the potential to:	**Yes/No**
- cause delays in progress towards achieving the conservation objectives of the site?	No
- interrupt progress towards achieving the conservation objectives of the site?	No
- disrupt those factors that help to maintain the favourable conditions of the site?	No
- interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No
- change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No
- interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No
- reduce the area of key habitats?	No
- reduce the population of key species?	No
- change the balance between key species?	No
- reduce diversity of the site?	No
- result in disturbance that could affect population size or density or the balance between key species?	No

The evaluation herein has found, that following the examination and analysis presented, it can be concluded on a reasoned basis, that the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities will not result in adverse effects on the Integrity of Slievefelim to Silvermines Mountains SPA, in circumstances where no reasonable scientific doubt remains.

7 Conclusion

This Natura Impact Statement has been prepared in support of the Proposed Larger Turbines and Met Masts amendment to the already authorised Upperchurch Windfarm, in order to allow an Appropriate Assessment determination in the context of Article 6(3) of the Habitats Directive, in view of existing case law. The report has been prepared in order to evaluate the significance of potential effects on European sites from the Proposed Larger Turbines and Met Masts alone and as part of the Whole UWF Project, and in-combination with other unrelated projects and activities.

Appropriate Assessment Stage One Screening of all European sites identified within a 15km radius of the the Proposed Larger Turbines and Met Masts and of the Whole UWF Project, and evaluated that the potential for significant effects on the Qualifying Interests of the Lower River Suir SAC, Lower River Shannon SAC, Clare Glen SAC and Special Conservation Interest of the Slievefelim to Silvermines Mountain SPA could not be excluded. Therefore these four European Sites were evaluated further at Stage Two of the Appropriate Assessment process.

It is determined that, following the implementation of mitigation measures for the protection of designated QIs and SCIs, water quality and against the spread of invasive species, as outlined in Section 6.5, that there is no likelihood of significant effects as a result of the Proposed Larger Turbines and Met Masts alone or as part of the Whole UWF Project, or in-combination with other unrelated projects and activities.

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC defines integrity as the 'coherence of the sites ecological structure and function, across its whole area, or the habitats, complex of habitats and/or population of species for which the site is classified'. Given the application of prescribed protective measures for the avoidance of impacts and the implementation of the required mitigation measures, the Proposed Larger Turbines and Met Masts amendment to the already authorised Upperchurch Windfarm will not give rise to adverse effects on the integrity of any of the Natura 2000 sites evaluated herein.

8 References

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An Bord Pleanala (2014) Upperchurch Windfarm Inspector's Report

An Bord Pleanala (2021) UWF Related Works Grant of Permission with Conditions

An Bord Pleanala (2020) UWF Related Works Planning Inspector's Report

An Bord Pleanala (2021) UWF Grid Connection Grant of Permission with Conditions

An Bord Pleanala (2020) UWF Grid Connection Planning Inspector's Report

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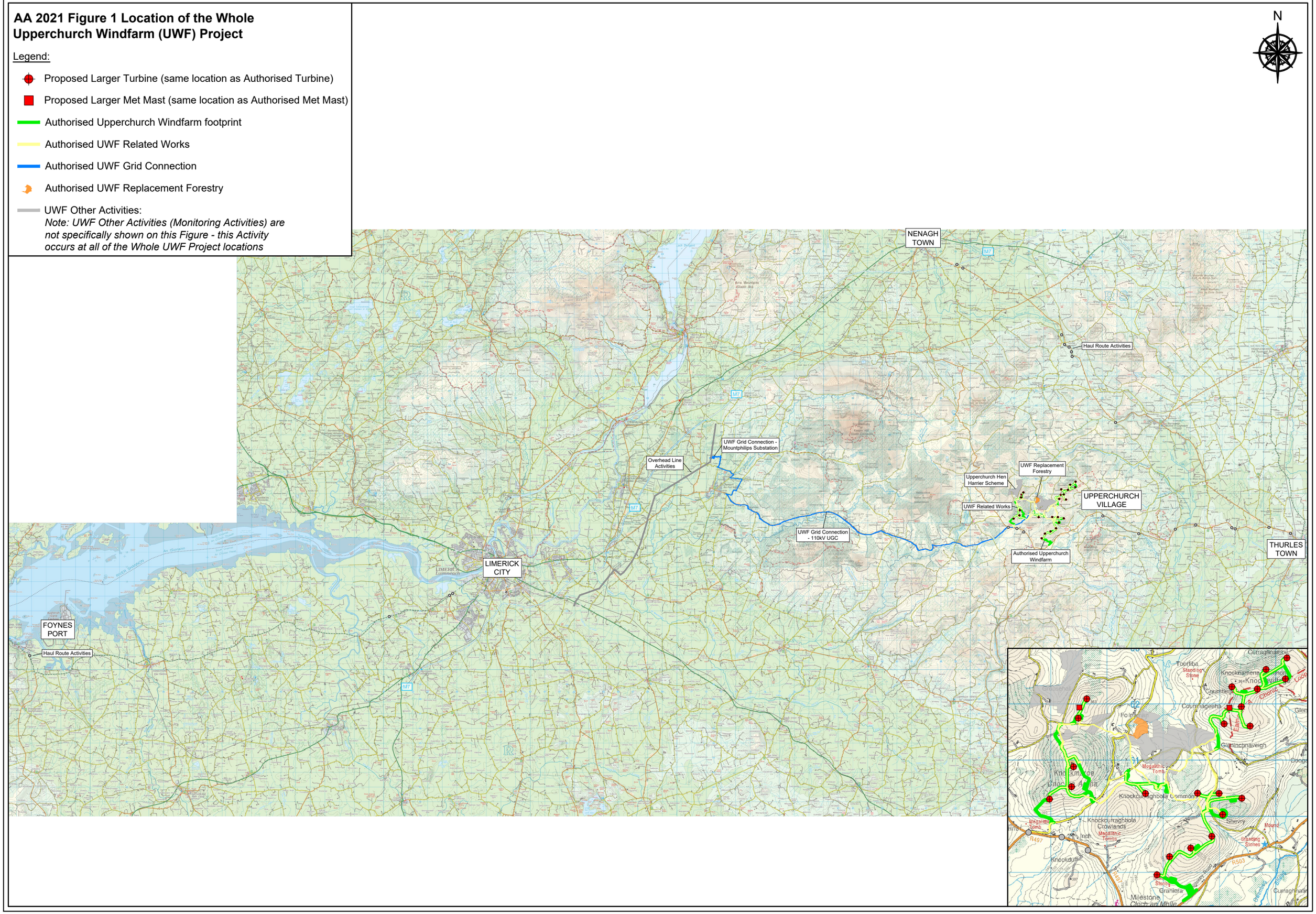
9 Figures

LIST OF FIGURES

AA 2021 Figure 1 Location of the Whole Upperchurch Windfarm (UWF) Project

Legend:

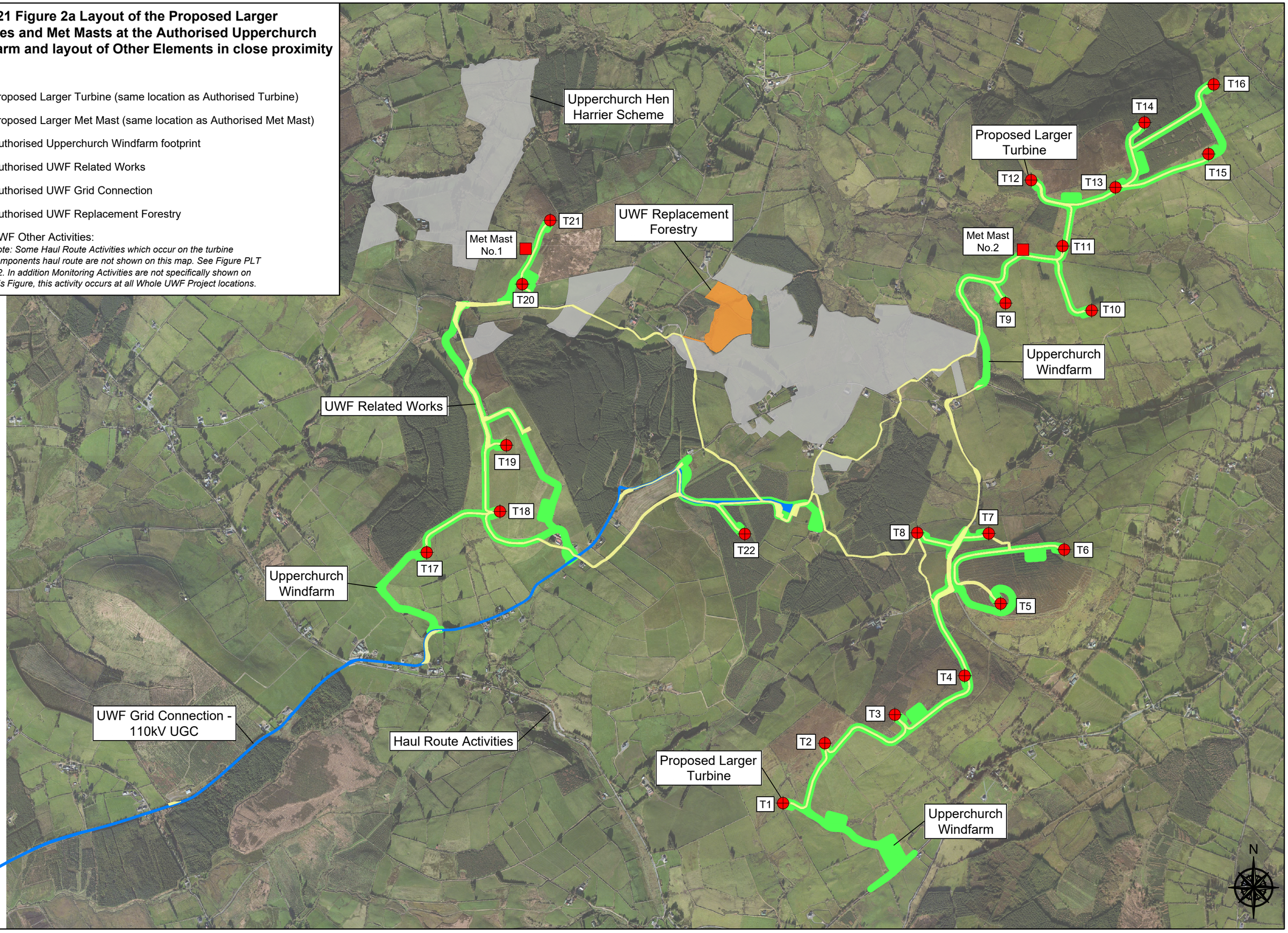
- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations



AA 2021 Figure 2a Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm and layout of Other Elements in close proximity

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: Some Haul Route Activities which occur on the turbine components haul route are not shown on this map. See Figure PLT 1.2. In addition Monitoring Activities are not specifically shown on this Figure, this activity occurs at all Whole UWF Project locations.



AA 2021 Figure 2b Layout of the Whole UWF Project on Discovery Mapping

Legend:

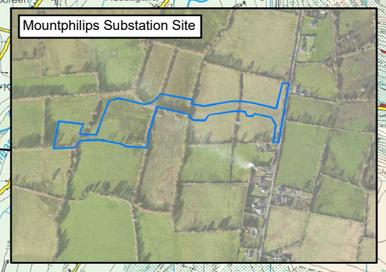
- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:

Note: Some Haul Route Activities which occur on the turbine components haul route are not shown on this map. See Figure PLT 1.2. In addition Monitoring Activities are not specifically shown on this Figure, this activity occurs at all Whole UWF Project locations.

Overhead Line Activities

UWF Grid Connection - Mountphilips Substation

Mountphilips Substation Site



Regional Road R503

UWF Grid Connection - 110kV UGC

Regional Road R503

Haul Route Activities

Upperchurch Hen Harrier Scheme

UWF Replacement Forestry

UWF Related Works

Upperchurch Windfarm

Upperchurch Windfarm

AA 2021 Figure 3a Surface Water Catchments in the Upperchurch Windfarm area

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: Some Haul Route Activities which occur on the turbine components haul route are not shown on this map. See Figure PLT 1.2. In addition Monitoring Activities are not specifically shown on this Figure, this activity occurs at all Whole UWF Project locations.
- Hydrometric Area
- Multeen (East)_SC_030 Sub Catchment
- Suir_SC_030 Sub Catchment
- Bilboa_SC_010 Sub Catchment

RIVER SUIR HYDROMETRIC AREA

LOWER SHANNON & MULKEAR HYDROMETRIC AREA

SUIR_SC_030

BILBOA_SC_010

MULTEEN (EAST)_SC_030

Met Mast No.1

Met Mast No.2

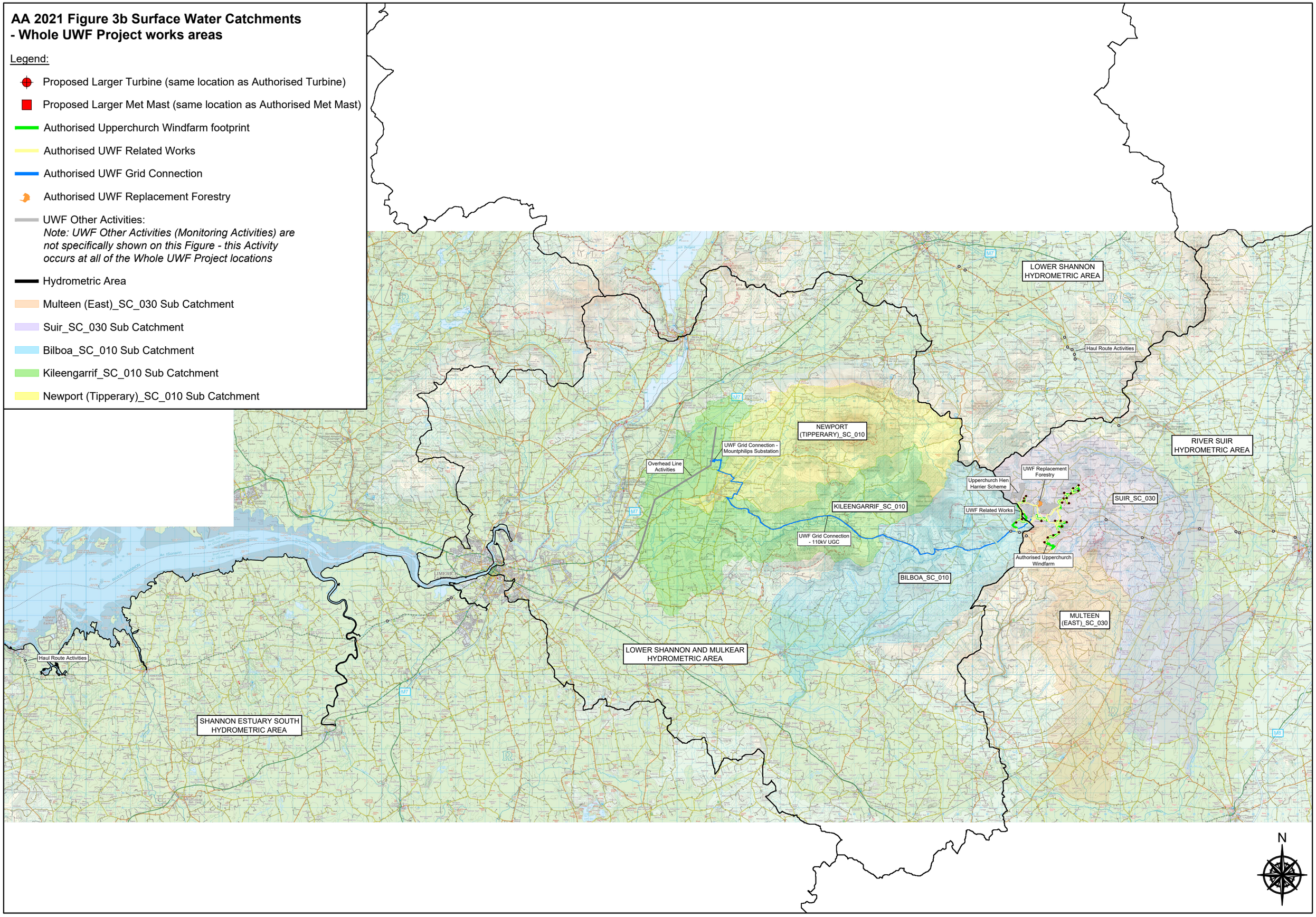
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22

Stone Row
Garranakilka
Seskin
Knockateora Commons
Mogland
Curraghnamoe
Toorliba
Standing Stone
Knocknamena
Coumbeg
Chonic
Loop
Gortnada
Glenbeg
Gortatoo
Foilnaman
Gleninchnaveigh
Megalithic Tomb
Cooga
Cappanaleigh
Pendye's Cross Rds
R503
Roan
Kilcornmon
Cill Chuimín
Knocknabansha
Cnoc na Bainsí
Megalithic Tomb
Megalithic Tomb
Knockcurraghbola Commons
Knockcurraghbola Cowlands
Megalithic Tombs
Inch
R497
Knockduff
Loughbrack
R503
Shevry
Mound
Standing Stones
Curraghduff
Standing Stones
Graniera
Milestone
Cloch an Mhile
Inchiyara
Owenbeg
Abhainn
Curraghnatinny
Lugnaskagh
Knockalough
Cnoc an Lo
Gortmahonoge
N

AA 2021 Figure 3b Surface Water Catchments - Whole UWF Project works areas

Legend:

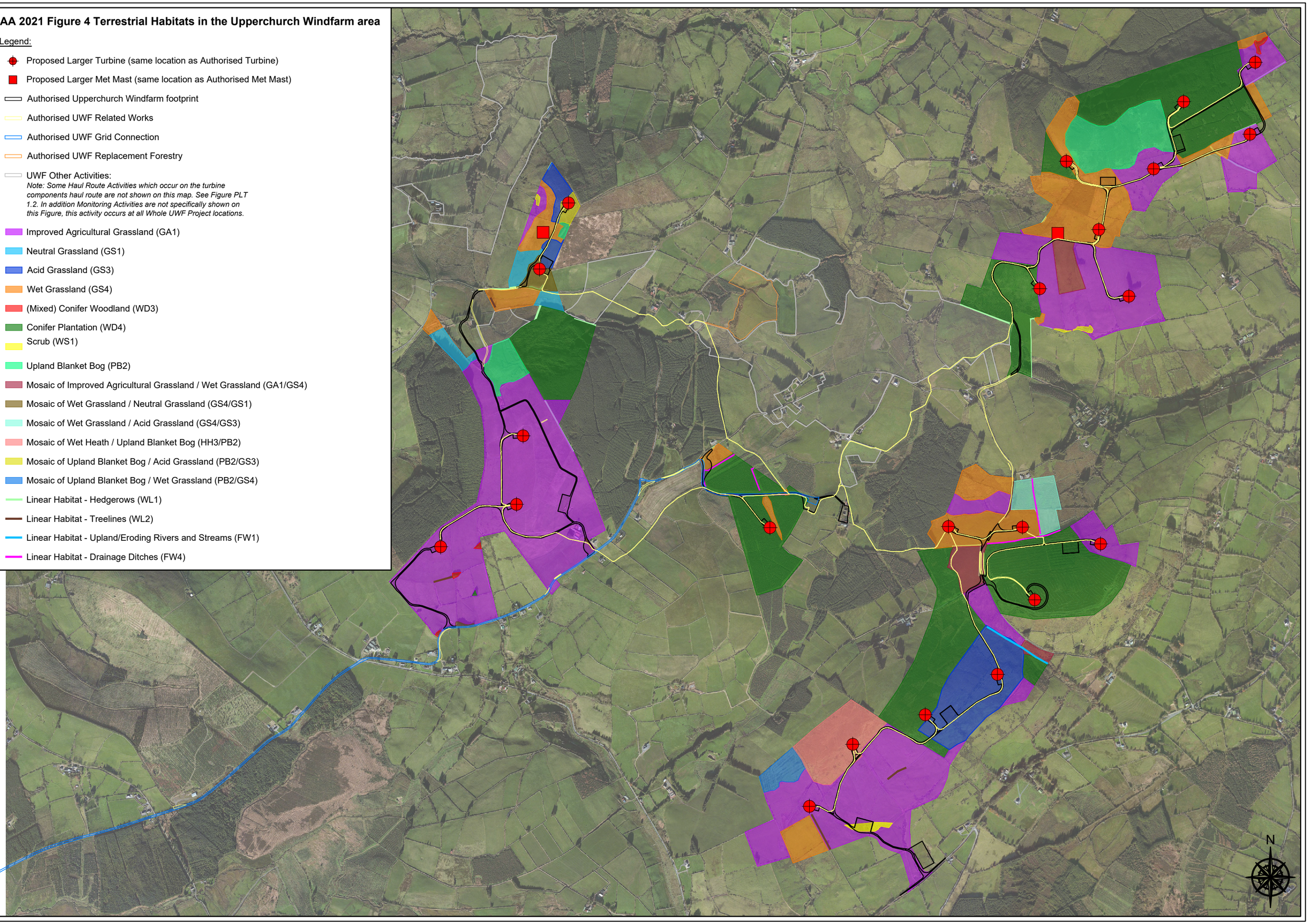
- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations
- Hydrometric Area
- Multeen (East)_SC_030 Sub Catchment
- Suir_SC_030 Sub Catchment
- Bilboa_SC_010 Sub Catchment
- Kileengarrif_SC_010 Sub Catchment
- Newport (Tipperary)_SC_010 Sub Catchment



AA 2021 Figure 4 Terrestrial Habitats in the Upperchurch Windfarm area

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: Some Haul Route Activities which occur on the turbine components haul route are not shown on this map. See Figure PLT 1.2. In addition Monitoring Activities are not specifically shown on this Figure, this activity occurs at all Whole UWF Project locations.
- Improved Agricultural Grassland (GA1)
- Neutral Grassland (GS1)
- Acid Grassland (GS3)
- Wet Grassland (GS4)
- (Mixed) Conifer Woodland (WD3)
- Conifer Plantation (WD4)
- Scrub (WS1)
- Upland Blanket Bog (PB2)
- Mosaic of Improved Agricultural Grassland / Wet Grassland (GA1/GS4)
- Mosaic of Wet Grassland / Neutral Grassland (GS4/GS1)
- Mosaic of Wet Grassland / Acid Grassland (GS4/GS3)
- Mosaic of Wet Heath / Upland Blanket Bog (HH3/PB2)
- Mosaic of Upland Blanket Bog / Acid Grassland (PB2/GS3)
- Mosaic of Upland Blanket Bog / Wet Grassland (PB2/GS4)
- Linear Habitat - Hedgerows (WL1)
- Linear Habitat - Treelines (WL2)
- Linear Habitat - Upland/Eroding Rivers and Streams (FW1)
- Linear Habitat - Drainage Ditches (FW4)



AA 2021 Figure 5a Hen Harrier Vantage Point Survey Locations in the Upperchurch Windfarm area

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Hen Harrier Vantage Point Survey Locations
- Slievefelim to Silvermines Mountain SPA

N

VP8
T16
T14
T15
T12
T13
Met Mast No.2
T11
T10
T9
VP9
Slievefelim to Silvermines Mountain SPA
VP6
VP7
T21
Met Mast No.1
T20
Authorised Upperchurch Windfarm
T19
T18
T17
T22
T8
T7
VP1
T6
VP2
T5
VP5
VP4
T4
T3
T2
T1
Slievefelim to Silvermines Mountain SPA
Authorised Upperchurch Windfarm
VP3
VP10

AA 2021 Figure 5b Hen Harrier Vantage Point Survey Locations for Whole UWF Project

Legend:

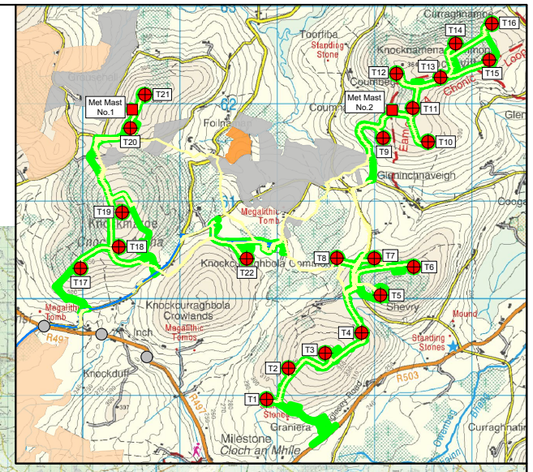
- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Upperchurch Windfarm Hen Harrier Vantage Point Survey Locations
- UWF Grid Connection Hen Harrier Vantage Point Survey Locations
- Slievefelim to Silvermines Mountain SPA

N

AA 2021 Figure 6 European Sites within 15km of the Whole UWF Project

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations
- 15km Study Area from Whole UWF Project
- Special Areas of Conservation
- Special Protection Areas



15km Whole Project Study Area

Lough Derg, North-East Shore SAC (002241)

Lough Derg (Shannon) SPA (004058)

Slieve Bernagh SAC (002312)

Silvermine Mountains West SAC (002258)

Silvermine Mountains SAC (000939)

Bolingbrook Hill SAC (002124)

Haul Route Activities

Kilduff, Devilsbit Mountain SAC (000934)

Glenomra Wood SAC (001013)

Keeper Hill SAC (001197)

Slievefelim to Silvermines SPA (004165)

Ratty River Cave SAC (002316)

UWF Grid Connection - Mountphilips Substation

Overhead Line Activities

Upperchurch Hen Harrier Scheme

UWF Replacement Forestry

UWF Related Works

Upperchurch Windfarm

Haul Route Activities

Haul Route Activities

River Shannon and River Fergus Estuaries SPA (004077)

Lower River Shannon SAC (002165)

UWF Grid Connection - 110kV UGC

Clare Glen SAC (000930)

Glenstal Wood SAC (001432)

Lower River Suir SAC (002137)

Anglesey Road SAC (002125)

Askeaton Fen Complex SAC (002279)

Askeaton Fen Complex SAC (002279)

Haul Route Activities

Lower River Shannon SAC (002165)

Barrigone SAC (000432)

Curraghchase Woods SAC (000174)

Lower River Shannon SAC (002165)

Philipston Marsh SAC (001847)

Tory Hill SAC (000439)

Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)

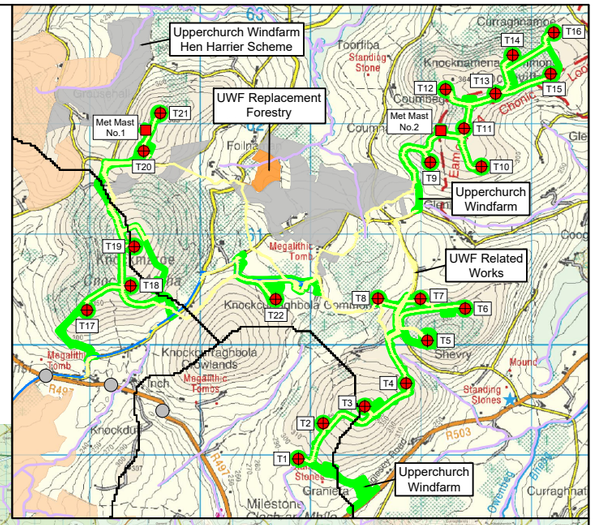
15km Whole Project Study Area

N

AA 2021 Figure 7 Hydrological Connectivity of the Whole UWF Project to European Sites

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations
- SubCatchments
- Special Areas of Conservation
- Special Protection Areas



Lough Derg, North-East Shore SAC (002241)

Lough Derg (Shannon) SPA (004058)

Slieve Bernagh SAC (002312)

Glenomra Wood SAC (001013)

Ratty River Cave SAC (002316)

Silvermine Mountains West SAC (002258)

Silvermine Mountains SAC (000939)

Bolingbrook Hill SAC (002124)

Kilduff, Devilsbit Mountain SAC (000934)

Keeper Hill SAC (001197)

Slievefelim to Silvermines SPA (004165)

NEWPORT (TIPPERARY)_SC_010

KILEENGARRIF_SC_010

SUIR_SC_030

UWF Grid Connection - 110kV UGC

River Shannon and River Fergus Estuaries SPA (004077)

Lower River Shannon SAC (002165)

Clare Glen SAC (000930)

Glenstal Wood SAC (001432)

BILBOA_SC_010

Lower River Suir SAC (002137)

Anglesey Road SAC (002125)

MULTEEN (EAST)_SC_030

Askeaton Fen Complex SAC (002279)

Askeaton Fen Complex SAC (002279)

Barrigone SAC (000432)

Curraghchase Woods SAC (000174)

Lower River Shannon SAC (002165)

Philipston Marsh SAC (001847)

Tory Hill SAC (000439)

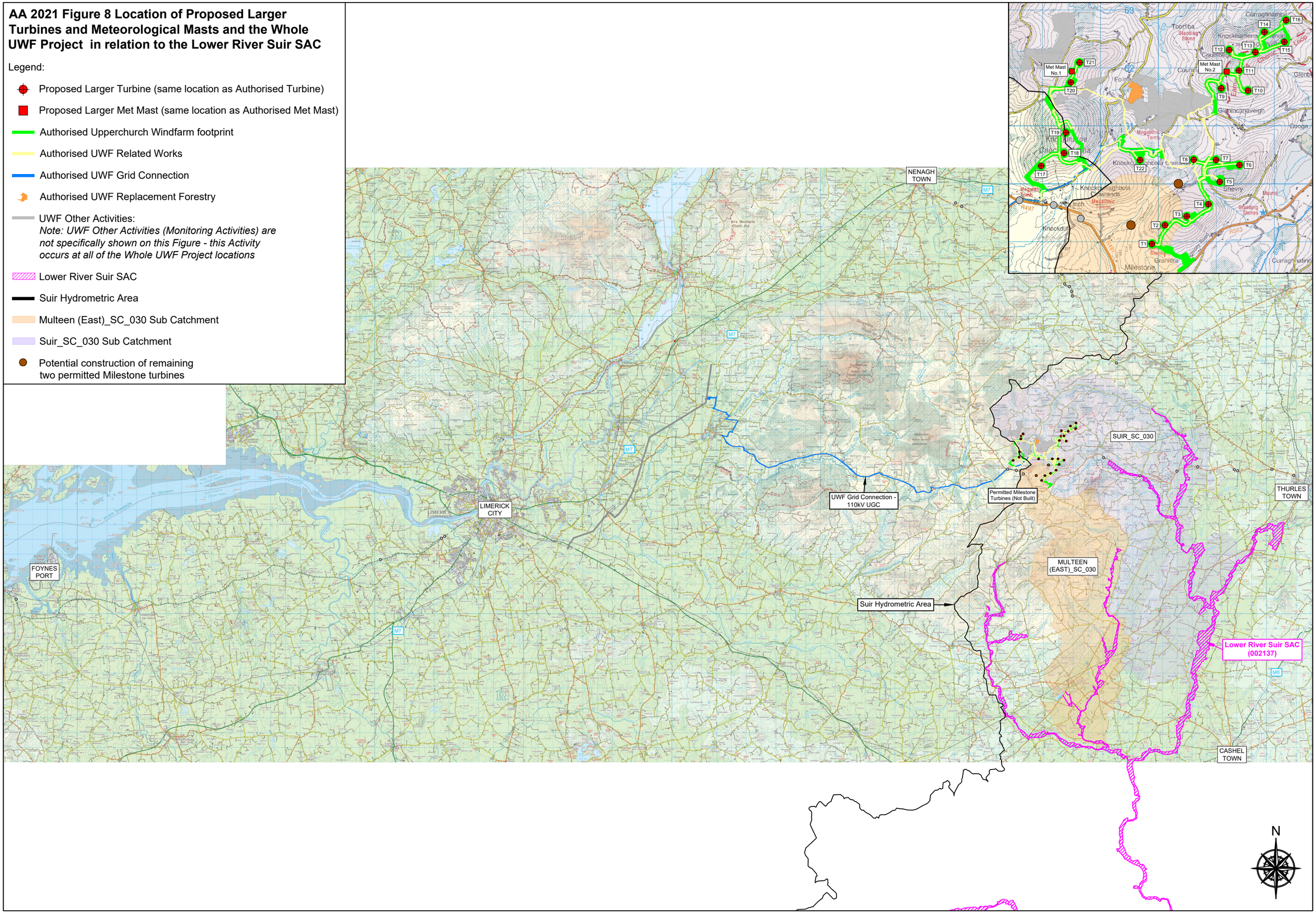
Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)

N

AA 2021 Figure 8 Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Lower River Suir SAC

Legend:

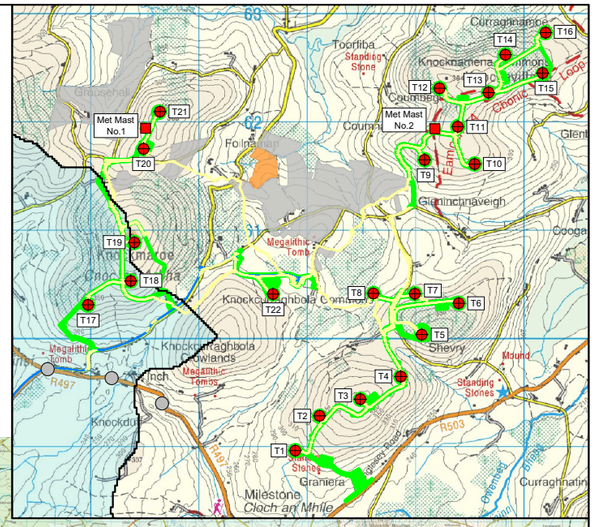
- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations
- Lower River Suir SAC
- Suir Hydrometric Area
- Multeen (East)_SC_030 Sub Catchment
- Suir_SC_030 Sub Catchment
- Potential construction of remaining two permitted Milestone turbines

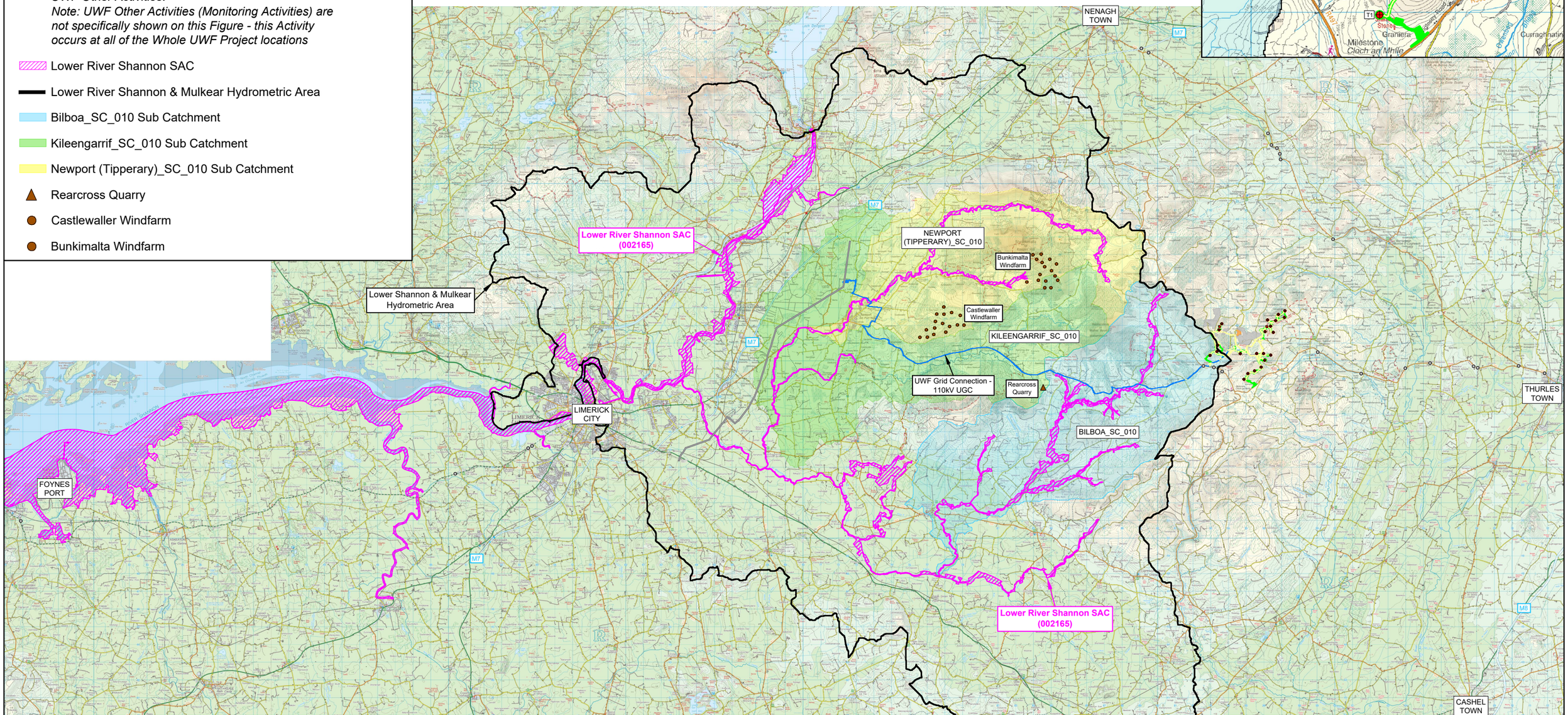


AA 2021 Figure 9 Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to the Lower River Shannon SAC

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations
- Lower River Shannon SAC
- Lower River Shannon & Mulkear Hydrometric Area
- Bilboa_SC_010 Sub Catchment
- Kileengarrif_SC_010 Sub Catchment
- Newport (Tipperary)_SC_010 Sub Catchment
- Rearcross Quarry
- Castlewaller Windfarm
- Bunkimalta Windfarm





AA 2021 Figure 10 Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to Clare Glen SAC

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations
- Clare Glen SAC
- Kileengarrif_SC_010 Sub Catchment
- Rearcross Quarry
- Castlewaller Windfarm
- Bunkimalta Windfarm

N

NENAGH TOWN
Haul Route Activities
Overhead Line Activities
UWF Grid Connection - Mountphilips Substation
Bunkimalta Windfarm
Upperchurch Hen Harrier Scheme
UWF Replacement Forestry
Castlewaller Windfarm
KILEENGARRIF_SC_010
UWF Related Works
Haul Route Activities
Upperchurch Windfarm
Rearcross Quarry
Clare Glen SAC (000930)
UWF Grid Connection - 110kV UGC
THURLES TOWN
LIMERICK CITY
FOYNES PORT
Haul Route Activities
CASHEL TOWN
M7
M8

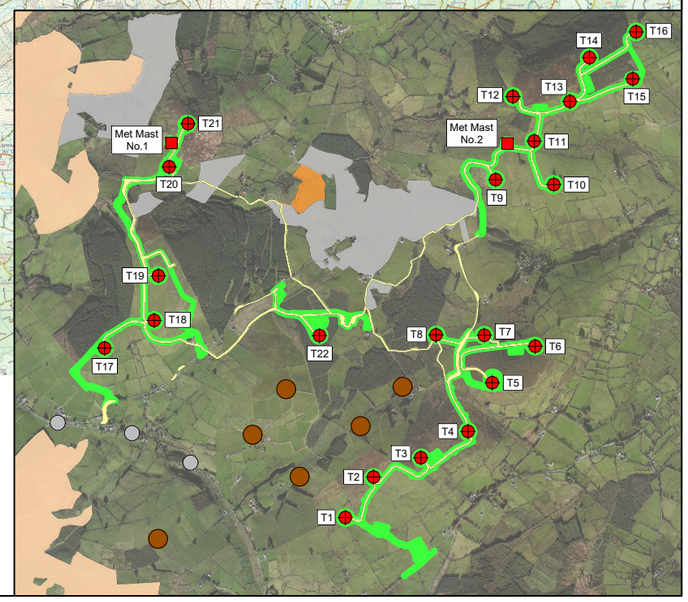
AA 2021 Figure 11 Location of Proposed Larger Turbines and Meteorological Masts and the Whole UWF Project in relation to Slievefelim to Silvermines Mountain SPA

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations
- Slievefelim to Silvermines Mountain SPA
- Rearcross Quarry
- Castlewaller Windfarm
- Bunkimalta Windfarm
- Milestone Windfarm

N

NENAGH TOWN
Upperchurch Windfarm Area
Haul Route Activities
Overhead Line Activities
UWF Grid Connection - Mountphilips Substation
Bunkimalta Windfarm
Upperchurch Hen Harrier Scheme
UWF Replacement Forestry
Castlewaller Windfarm
UWF Related Works
Haul Route Activities
Upperchurch Windfarm
Rearcross Quarry
Milestone Windfarm
THURLES TOWN
UWF Grid Connection - 110kV UGC
LIMERICK CITY
FOYNES PORT
Haul Route Activities
M7



APPENDIX 2021 A1:
FINDING OF NO SIGNIFICANT EFFECTS (FONSE) REPORT

TO

APPROPRIATE ASSESSMENT REPORT 2021

FOR

PROPOSED LARGER TURBINES AND MET MASTS AT THE AUTHORISED UPPERCHURCH WINDFARM, CO TIPPERARY

1.1 Finding of No Significant Effects Report

In accordance with the EC (2001) guidance document, Assessment of plans and projects significantly affecting Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, A Finding of No Significant Effects Report has been completed for the Proposed Larger Turbines and Met Masts amendment to the already authorised Upperchurch Windfarm. The standard matrix for this report provided in Annex 2 of the guidance document was followed. Line items in italics are taken directly from the guidance document.

Finding of No Significance Effects Report	
Name and location of the Natura 2000 sites	The screening appraisal provided herein has examined potential effects via source pathway linkages on the designated SACs and SPAs within 15km of the Proposed Larger Turbines and Met Masts and of the Whole UWF Project. The Stage 1 Screening Evaluation provided herein has examined potential effects via source pathway linkages on the designated SACs and SPAs within 15km of the Whole UWF Project, either alone or in-combination with the other plans or projects. There are 23 European Sites within the extended Study Area - nineteen Special Areas of Conservation (SAC) and four Special Protection Area (SPA: 1. Slievefelim to Silvermines Mountain SPA (004165) 2. Lower River Suir SAC (002137) 3. Lower River Shannon SAC (002165) 4. Anglesey Road SAC (002125) 5. Bolingbrook Hill SAC (002124) 6. Keeper Hill SAC (001197) 7. Silvermine Mountain SAC (000939) 8. Silvermine Mountain West SAC (002258) 9. Philipston Marsh SAC (001847) 10. Kilduff, Devilsbit Mountain SAC (000934) 11. Clare Glen SAC (000930) 12. Glenstal Wood SAC (001432) 13. Slieve Bernagh Bog SAC (002312) 14. Lough Derg, North-East Shore SAC (002241) 15. Glenomra Wood SAC (001013) 16. Tory Hill SAC (000439) 17. Ratty River Cave SAC (002316) 18. Askeaton Fen Complex SAC (002279) 19. Barrigone SAC (000432) 20. Curraghchase Woods SAC (000174) 21. Lough Derg (Shannon) SPA (004058) 22. River Shannon and River Fergus Estuaries SPA (004077) 23. Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)
Description of the project or plan	**Overview:** The subject development, Proposed Larger Turbines and Met Masts, is a proposed amendment to the authorised Upperchurch Windfarm. The applicant, Ecopower Developments Ltd seeks to amend the size of the authorised Upperchurch Windfarm turbines to larger turbines and to amend the

Finding of No Significance Effects Report	
	size and design of the authorised met masts to larger met masts which will have a lattice rather than a tubular tower design. The Proposed Amendment to the Authorised Upperchurch Windfarm relates to the already authorised twenty-two turbines and two met masts, which were authorised in 2014 but are not yet constructed. Upperchurch Windfarm is authorised for an area 2km west of Upperchurch village and 18km to the west of Thurles, County Tipperary. The authorised Upperchurch Windfarm is part of a larger whole project, which also includes UWF Grid Connection (authorised), UWF Related Works (authorised), UWF Replacement Forestry (authorised) and UWF Other Activities. **Description of the Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm**: The current proposal is to increase in the size of the authorised wind turbines from upto 126.6 meters maximum blade tip height to wind turbines upto 152 meters maximum blade tip height, by increasing the wind turbine hub heights to within a range of between 89 meters and 94 meters in height and increasing wind turbine rotor diameters to within a range of between 112 meters and 117 meters in diameter. (referred to herein as the proposed larger turbines). The proposed larger turbines will also generate c.80% more renewable electricity than their authorised counterparts. It is also proposed to amend the height and design of the met masts from a tubular tower mast up to 80m in height to a lattice tower mast upto 93.5m in height. There will be no change to the remaining elements of the Authorised Upperchurch Windfarm, as per: • No changes to the locations of the authorised turbines or of the authorised meteorological masts; • No changes to the authorised Windfarm Electrical Substation; • No changes to the authorised windfarm site access roads, as these roads can accommodate the Proposed Larger Turbines and Met Masts; • No changes of the authorised crane hardstanding areas or to the authorised turbine foundations. The authorised hardstanding areas are adequately sized to cater for larger turbines and the concrete, steel and aggregates required for the foundations for the larger turbines will be in line with the requirements for the authorised turbines. This is because the original foundations and hardstanding areas were designed with headroom inbuilt, in order to cater for whichever turbine type was eventually chosen; • No additional excavations or imported rock required for the construction of the Proposed Larger Turbines and Met Masts. Therefore, the size and volume of the authorised borrow pits and stone requirements do not need to increase; • No changes to the haul route for construction materials or turbine components including outsized components during the construction phase, and there will be no change to access requirements during the operational phase;

Finding of No Significance Effects Report	
	• No changes to ancillary works such as the site entrance, watercourse crossing, drainage systems, site compounds, borrow pits or fencing; • No additional forestry felling or hedgerow removal is required for construction; • No changes to the use of Natural Resources (Land, Excavated Soils & Rock, Windtake) during construction or operation; • No material change to emissions during construction (dust, noise, vibration and light) or emissions during operation (noise, EMF, shadow flicker); • No change to Waste levels or treatment during construction or operation; • No changes to levels of site activity, use of machinery, number of personnel or traffic during construction or operation; • No changes to the decommissioning procedure. • There will be no changes to the 2013 Sediment & Erosion Control Plan or to the 2013 Ecological Management Plan due to the proposed larger turbines and met masts. The proposed amendment will be constructed and operated in accordance with these Plans. • There is a change to the 2013 Preliminary Environmental Management Plan, which has been updated to include the Proposed Larger Turbines and Met Masts amendment, and accompanies this planning application as: Environmental Management Plan 2021 for Upperchurch Windfarm (including Proposed Larger Turbines & Met Masts); and • No change to the Other Elements of the Whole UWF Project. **Purpose:** Since 2014, wind turbine technology has advanced and become more controllable and efficient, with larger rotors capable of higher energy capture. This amendment will facilitate the installation of the latest wind turbine technology which delivers higher energy production (c.80% increase) and also enhanced controllability of noise and shadow flicker emissions. The proposal represents a sustainable use of the planning permission for 22 No. turbines and of the 94MW grid connection which have already both been assessed through the planning process as acceptable.
Is the Project or Plan directly connected with or necessary to the management of the site (provide details)?	No
Are there other projects or plans that together with the project of plan being assessed could affect the site (provide details)?	Yes: In addition to any in-combination effects of the Whole UWF Project (i.e. Upperchurch Windfarm, UWF Related Works, UWF Grid Connection, UWF Replacement Forestry and UWF Other Activities), the following other projects and activities were considered in this AA Report: • existing Rear Cross Quarry, • existing Milestone Windfarm (*and also including the two permitted but not built turbines*), • consented Castlewaller Windfarm (and *potential* grid connection),

Finding of No Significance Effects Report	
	• *potential* Bunkimalta Windfarm (and consented grid connection), • agriculture, forestry and turf-cutting activities.
The Assessment of Significant Effects	
Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site	Potential likely significant effects to European sites from the Whole UWF Project have been identified via the following impact pathways: **SAC Pathway 1**: Direct effects to **QI habitats** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within the SAC** **SAC Pathway 2**: Indirect Effects to **QI habitats** of an SAC Site (i.e. via reductions in water quality or spread of invasive species) **within the SAC** **SAC Pathway 3**: Indirect Effects to **QI habitats**, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ***ex-situ*** the SAC **SAC Pathway 4**: Direct effects to **QI species** of an SAC Site (i.e. mortality) **within or *ex-situ*** the SAC **SAC Pathway 5**: Indirect effects to **QI species** of an SAC Site (i.e. disturbance /displacement) **within** the SAC **SAC Pathway 6**: Indirect effects to **QI species** of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) **within** the SAC **SAC Pathway 7**: Indirect effects to **QI species** of the SAC Site (i.e. disturbance /displacement) ***ex-situ*** the SAC **SAC Pathway 8**: Indirect effects to **QI species** of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ***ex-situ*** the SAC. **SPA Pathway 1**: Direct <u>disturbance or mortality</u> effects to **SCI species within an SPA** **SPA Pathway 2**: Indirect effects to **SCI species within an SPA** (i.e. <u>Secondary effects on suitable habitat</u> via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a <u>reduction in prey item species</u>) **SPA Pathway 3**: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. <u>Secondary effects on suitable habitat</u> via habitat loss, degradation, fragmentation or loss/reduction in connectivity, or through a <u>reductions in prey item species</u> outside their respective SPA). **SPA Pathway 4**: Indirect effects to **SCI species *ex-situ* an SPA** (i.e. <u>disturbance or mortality</u> effects to SCI species outside their respective SPA).
Explain why these effects are not considered significant	Through a Screening for Appropriate Assessment, significant effects to 19 European sites were not considered to be likely due to the absence of effective pathways for likely significant effects (e.g. hydrological, terrestrial) between these European sites and the Whole UWF Project. These European Sites are Anglesey Road SAC (002125), Bolingbrook Hill SAC (002124), Keeper Hill SAC (001197), Silvermine Mountain SAC (000939), Silvermine Mountain West SAC (002258), Philipston Marsh SAC (001847), Kilduff, Devilsbit Mountain SAC (000934), Glenstal Wood SAC (001432), Slieve Bernagh Bog SAC (002312), Lough Derg, North-East Shore SAC (002241), Glenomra Wood SAC (001013), Tory Hill SAC (000439), Ratty River Cave SAC (002316), Askeaton Fen Complex SAC (002279), Barrigone SAC (000432), Curraghchase Woods SAC (000174), Lough Derg (Shannon) SPA (004058), River Shannon and River Fergus Estuaries

Finding of No Significance Effects Report			
	SPA (004077), and Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161), However, the Screening for Appropriate Assessment determined that the Whole UWF Project, including the Proposed Larger Turbines and Met Masts amendment has potential, via impact pathways, to cause effects to the following 4 European Sites (3 SACs, 1 SPA); ➢ Lower River Suir SAC (002137) ➢ Lower River Shannon SAC (002165) ➢ Clare Glen SAC (000930, ➢ Slievefelim to Silvermines Mountain SPA (004165) Likely significant effects to these four European sites have been further assessed in a Stage 2 Appropriate Assessment.		
Name of Agency or Body Consulted	Summary of Response		
Developments Application Unit	Pre-Planning Reference: G Pre00084/2020 / WA-CON-A200519-0027 No comments on European Sites		
Data Collected to Carry out the Assessment			
Who carried out the assessment	Sources of Data	Level of assessment completed	Where can the full results of the assessment be accessed and viewed
INIS Environmental Consultants Ltd Planning and Environmental Consultants Suite 11, Shannon Commercial Properties, Information Age Park, Ennis, County Clare, Ireland.	Conservation objectives, site synopsis, site boundary information for all European Sites; Appropriate Assessment Reports for the Whole UWF Project - Upperchurch Windfarm Revised NIS 2013, Revised AA Reporting for UWF Related Works 2019, AA Reporting for UWF Grid Connection 2019; and descriptions and drawings of the Proposed Larger Turbines and Met Masts; descriptions and drawings of the authorised Upperchurch Windfarm, authorised UWF Related Works, authorised UWF Grid Connection, authorised UWF Replacement Forestry and of the UWF Other Activities.	Stage 1: Screening for Appropriate Assessment. Following screening it can reasonably be concluded that Likely Significant Effects are not likely to occur to 19 European sites as a result of the Proposed Larger Turbines and Met Masts or as a result of the Whole UWF Project. However, potential for Likely Significant Effects to four European sites have been identified and further assessed in Stage 2 Appropriate Assessment.	The public office for An Bord Pleanála, 4 Marlborough St, Rotunda, Dublin 1, D01 V902 www. upperchurchwindfarmamendments.ie

APPENDIX 2021 A2:

SCOPING FOR OTHER UNRELATED PROJECTS AND ACTIVITIES

APPROPRIATE ASSESSMENT REPORT 2021

FOR

PROPOSED LARGER TURBINES AND MET MASTS

AT THE AUTHORISED UPPERCHURCH WINDFARM, CO TIPPERARY

List of Tables

Table 1: List of Other Projects and Activities included in the Scoping exercise

ID	Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
1	Killonan to Nenagh 110kV Overhead Line	Utilities	Existing 110kV overhead line between Killonan 110kV Station near Limerick City and the 110kV/38kV substation station on the outskirts of Nenagh town. The 110kV overhead lines are located to the west of the UWF Grid Connection 110kV UGC in Mountphilips townland. The new Mountphilips Substation associated with the UWF Grid Connection will connect to this line via the new End Masts.	Between Killonan Station and Nenagh Substation	Existing	Limerick Tipperary	Existing
2	Shannonbridge to Killonan 220kV Overhead Line	Utilities	Existing 220kV overhead line between Shannonbridge 220kV Station and Killonan 110kV Station near Limerick City. The 220kV overhead lines pass over the route of the UWF Grid Connection 110kV UGC in Coole townland.	Between Shannonbridge Station and Killonan Station	Existing	Offaly Tipperary Limerick	Existing
3	Bunkimalta Windfarm	Energy	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. Consented Grid Connection: 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, and c.11km to the northwest of the UWF Related Works, and c.12.5km to the northwest of the UWF Replacement Forestry. Modifications to the existing entrance from the L-2163 to the Keeper Hill Coillte Forest.	Potential windfarm: Bunkimalta, Baura-glanna, Lackabrack, Knockfune and Foilduff at Keeper Hill Grid connection: Tooreen, Logg, Bally-quiveen, Coolagh, Mountisland, Lissa-tunny, Tullamoylin, Ballinenagh, Curragh-arneen, Kilboy, Tyone, Pollanorman, Curryquin, Ballynaclogh, Lacka-brack, Foilduff, Mucklin, Bolingbrook, Kilriffet and Ballygasheen	Potential windfarm, Consented grid connection	Tipperary	n/a (for windfarm) 16600433 (grid connection) 16600432 (entrance)

ID	Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
4	Castlewaller Windfarm	Energy	Consented Windfarm: 16 turbines (each with a maximum hub height of 100m, maximum rotor diameter of 90m, and with a total tip height of 145m), one permanent meteorological mast, 2 borrow pits, a sub-station including a control building, new internal access roads, upgrading of existing internal access roads, expansion of drainage system, turbine hardstands, wastewater holding tank, underground cables and ancillary works. Potential Grid Connection: 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) proposed underground cabling to connect the windfarm to Killonan Substation. The Potential route of the grid connection cabling 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 via an existing forestry entrance (R503) (along the 110kV UGC route) was also included in the SID Pre-Application consultations for the grid connection.	Windfarm: Castlewaller, Newport, Co. Tipperary Potential grid connection: Castlewaller, Carrowkeale, Derryleight, Coolnacalla, Scraggeen, Ashroe, Annagh, Laghtane,, Ballyvarra, Foyle, Killonan and Milltown	Consented Windfarm, Potential grid connection	Tipperary	16600472, 11510251 SID Pre-Application: 303293-19.
5	Milestone Windfarm	Energy	Milestone Windfarm is an existing windfarm located adjacent to the southwest of the consented Upperchurch Windfarm at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera, Shevry, Inchivara and Knockduff. Milestone Windfarm comprises 4 No. existing wind turbines (each with a maximum tip height of 126m) along with new access tracks, and electrical substation, a borrow pit and associated works. In addition to the four existing turbines, two of the original Milestone turbines, which were permitted but were not built, are also included as part of the Milestone Windfarm for the purposes of the in-combination evaulations (i.e. 6 turbines in total). The grid connection associated	Windfarm: Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera and Shevry, Co. Tipperary & Knockduff & Inchivara, Milestone, Co. Tipperary	Existing	Tipperary	12510385, 1410 16600701

ID	Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
			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.				
6	Garracummer Windfarm	Energy	13 no. wind turbines, turbine hardstands, access roads, drainage; a substation control building with fenced compound for electrical equipment; underground electrical cables linking the turbines with the substation compound; underground communication cables. Garracummer Windfarm is located c.4km to the southwest of the Upperchurch Windfarm	Curraghmarky, Birchgrove, Moanvaun, Garracummer, Cummer More, Cummer Beg	Existing	Tipperary	041259 041034 041178
7	Hollyford Windfarm	Energy	3 wind turbine generators, 80m in hub height, c.4.5km to the south of Upperchurch Windfarm	Glenough Upper TD, Hollyford, Co. Tipperary	Existing	Tipperary	05287 12400
8	Knockastanna Windfarm	Energy	4 no. turbines, sub-station, access road, monitoring mast	Curraghfoil, Doon, Co Limerick	Existing	Limerick	011385
9	Gortnahalla Turbine	Energy	Single wind generator with a maximum output set at 500kw, hub height 65m	Gortnahalla, Upperchurch, Co. Tipperary	Existing	Tipperary	12510368
10	Rear Cross Quarry	Quarry	Existing quarry using blasting and hydraulic excavators on a total site area of 8.5ha. Activities involve extraction of aggregate, processing of the extracted material using mobile plant and screening and crushing prior to stockpiling for sale off site. Restoration/rehabilitation of the entire quarry site will take place following the completion of extraction, as per planning conditions. This quarry is just south of Rear Cross village at Shanballyedmond townland. This project was accompanied by Environmental Reports	Shanballyedmond Rearcross, Co. Tipperary, Co. Tipperary	Existing	Tipperary	11510323

ID	Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
			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.*				
11	Foilnaman Mast	Utilities	Existing communications mast comprising a 30m steel lattice mast structure at Knockmaroe townland, in the vicinity of the UWF Related Works/Upperchurch Windfarm site.	Knockmaroe	Existing	Tipperary	10510462
12	Cummermore Communication Pole	Utilities	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, together with associated equipment, cabling, gantry pole, GPS timing antenna, cabinet and fencing.	Cummermore	Existing	Tipperary	14600313
13	Newport Regional Water Supply	Utilities	Existing Irish Water facility in New Ross townland. Surface water supply from the Newport River upstream of Rockvale Bridge, with groundwater supply from wells in Castlewaller townland. Upgrade works on the existing local network – completed, no further upgrade works are currently planned.	Newross, Newport	Existing	Tipperary	n/a
14	Thurles Regional Water Treatment Works	Utilities	The construction of a water treatment plant and outfall to the River Suir. The water treatment plant will consist of a water treatment and administration building, sludge dewatering building, ESB sub-station, generator & oil tank enclosure, raw water balancing tank, clear water tanks, sludge balancing tank, sludge thickening and sludge holding tank, washwater tank, sludge skip and emergency sludge storage area, chemical storage tanks, washwater storage tank and all	Bohernacrusha, Killeenyarda, Holycross, Co. Tipperary	Under Construction Completion expected in 2021	Tipperary	16600877

ID	Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
			associated site development and site excavation works above and below ground				
15	Waste Management Facility, Thurles	Utilities	Waste management facility with facility buildings, conveyance plant, offices, on-site waste water treatment plant & associated pipework, surface water collection system with rainwater harvesting, attenuation measures, vehicle parking, fuelling facilities, noise attenuation barriers and associated and ancillary works including weighbridge, wheelwash, relocated hydrocarbon interceptor, silt trap, & pipework, and slabs. The facility recovers inert waste arising from construction & demolition activity including concrete, bricks, tiles, or other such similar material. The facility will recover, store, & transfer dry recyclables and will receive, store, & transfer waste (other than hazardous waste) for onward disposal. A waste facility permit would be required in relation to the development.	Monakeeba, Mill Road, Thurles	Existing	Tipperary	15601055
16	Forestry entrances, Cappamore (new entrance and upgrade of existing entrance)	Forestry	Construction of a new entrance from public roadway onto forestry lands on the Western side of the public roadway, to comprise of the provision of splayed access, clear visibility sightlines, associated setting back of adjacent roadside boundaries, provision of associated surface water drainage, fences, finished hardcored structure to access area and all associated site works. Upgrade of existing entrance from public roadway onto forestry lands on the Eastern side of the public roadway, to comprise the provision of the same works as above.	Cappamore,	Consented	Limerick Local Authorities	19738, 19739

ID	Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
17	Forestry entrance, CummerBeg	Forestry	Construction of new entrance from public roadway onto forestry lands, to comprise the provision of splayed access, clear visibility sightlines, associated setting back of adjacent roadside boundaries, provision of associated surface water drainage, fences, finished hardcored structure to access area and all associated siteworks	Cummer Beg, Kilcommon	Consented	Tipperary County Council	18601167
~~18~~	~~Forestry entrance, Knockshanbrittas~~	~~Forestry~~	~~Construction of new entrance from public roadway onto forestry lands, to comprise the provision of splayed access, clear visibility sightlines, associated setting back of adjacent roadside boundaries, provision of associated surface water drainage, fences, finished hardcored structure to access area and all associated siteworks~~	~~Knockshanbrittas, Klicommon~~	~~Proposed~~ **Withdrawn**	Tipperary County Council	19600640
~~19~~	~~Proposed Quarry at 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 - 690,000m³ 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.~~	~~Curraghduff, upperchurch~~	~~Proposed - Request for Further Information~~ **Withdrawn**	Tipperary County Council	19600317
20	Biorefinary facility, Moyne, Thurles	Utility	Biorefinery facility comprising of a process building with processing areas, plant rooms, stores, personnel & administrative areas; external bunded process & storage areas; vessels and tanks; CHP plant; an effluent & water treatment plant which includes bunded tanks & a building; sewage treatment plant; water storage tanks & site development works including demolition of an existing electrical building, roads, paved areas, parking areas, drains and services, bore well, lighting, fire water retention tank, attenuation pond, site fencing, alterations to the discharge pipeline from the sewage	Killoran, Moyne, Thurles	Consented	Tipperary County Council	18601296

ID	Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
			treatment plant, weighbridges & weighbridge office, connection to an existing outfall pipeline and landscaping works. The application is accompanied by an Environmental Impact Assessment Report. This application relates to development which comprises or is for the purpose of an activity requiring an Integrated Pollution Prevention and Control Licence				
21	Newport town Park	Public Facility	A recently consented public park in Newport town, Co. Tipperary. The new town 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 park includes excavations, groundworks, landscaping and car-parking facilities on lands immediately adjacent to the Newport River. Funding secured. Construction commenced 2020, completion expected in 2021.	Mulkear View, Tullow, Newport	Under construction	Tipperary County Council	PL92.302960
~~22~~	~~Glamping Site at Lackamore~~	~~Tourism~~	~~Proposed glamping site comprising of 8 no individual glamping units, a storage unit, parking, wastewater treatment system, new signage at entrance and associated site works~~	~~Lackamore, Newport~~	~~Proposed~~ **Withdrawn**	Tipperary County Council	19601111
	Public Roads	Infrastructure	Public road maintenance/upgrade works	n/a	n/a	n/a	n/a
	Public Water Mains	Infrastructure	Public water mains works	n/a	n/a	n/a	n/a
	Forestry	Activity	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 sur-rounding landuse in the upland area relates to forestry.	n/a	Ongoing	n/a	n/a

ID	Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
	Agriculture	Activity	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.	n/a	Ongoing	n/a	n/a
	Turf-Cutting	Activity	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).	n/a	Ongoing	n/a	n/a

A Desktop Review of Tipperary County Council and An Bord Pleanála websites in 2020 and again in 2021 found that there have been no new turbines granted or proposed within 20km of Upperchurch Windfarm.

TABLE 2: SCOPING OF OTHER UNRELATED PROJECTS

GEOGRAPHICAL BOUNDARY FOR POTENTIAL CUMULATIVE IMPACT PATHWAYS TO EUROPEAN SITES

Geographical Boundary:	15km from footprint of UWF Grid Connection and the Other Elements of the Whole UWF Project

Other Projects or Activities located within the Geographical Boundary

Other Project No.1	Killonan to Nenagh 110kV Overhead Line
Other Project No.2	Shannonbridge to Killonan 220kV Overhead Line
Other Project No.3	Bunkimalta Windfarm
Other Project No.4	Castlewaller Windfarm
Other Project No.5	Milestone Windfarm
Other Project No.6	Garracummer Windfarm
Other Project No.7	Hollyford Windfarm
Other Project No. 8	Knockastanna Windfarm
Other Project No. 9	Gortnahalla Turbine
Other Project No.10	Rear Cross Quarry
Other Project No.11	Foilnaman Mast
Other Project No.12	Cummermore Communication Pole
Other Project No.13	Newport Regional Water Supply
Other Project No.14	Thurles Regional Water Treatment Works
Other Project No.15	Waste Management Facility, Thurles
Other Project No.16	Forestry entrance, Cappamore
Other Project No.17	Forestry entrance, CummerBeg
Other Project No.20	Biorefinary facility, Thurles
Other Project No.21	Newport Town Park
Activity:	Public Road works
Activity:	Public Water works
Activity	Forestry
Activity	Agriculture
Activity	Turf-Cutting

TIMEFRAME BOUNDARY FOR POTENTIAL CUMULATIVE IMPACT PATHWAYS TO EUROPEAN SITES

Timeframe Boundary:	**Construction Stage and Operational Stage of UWF Grid Connection**

Other Projects or Activities		**Within the Timeframe Boundary? Y/N**
Other Project No.1	Killonan to Nenagh 110kV Overhead Line	No - Construction Stage complete
Other Project No.2	Shannonbridge to Killonan 220kV OHL	No - Construction Stage complete
Other Project No.3	Bunkimalta Windfarm	Yes – Potentially
Other Project No.4	Castlewaller Windfarm	Yes – Potentially
Other Project No.5	Milestone Windfarm	Yes- For Operation Effects
Other Project No.6	Garracummer Windfarm	No - Construction Stage complete
Other Project No.7	Hollyford Windfarm	No - Construction Stage complete
Other Project No.8	Knockastanna Windfarm	No - Construction Stage complete
Other Project No.9	Gortnahalla Turbine	No - Construction Stage complete
Other Project No.10	Rear Cross Quarry	Yes – ongoing in the area
Other Project No.11	Foilnaman Mast	No - Construction Stage complete
Other Project No.12	Cummermore Communication Pole	No - Construction Stage complete
Other Project No.13	Newport Regional Water Supply	No – upgrades complete

Other Project No. 14	Thurles Regional Water Treatment Works	Yes – Potentially
Other Project No.15	Waste Management Facility, Thurles	No - Construction Stage complete
Other Project No.16	Forestry entrance, Cappamore	Yes – Potentially
Other Project No.17	Forestry entrance, CummerBeg	Yes – Potentially
Other Project No.20	Biorefinary facility, Thurles	Yes – Potentially
Other Project No.21	Newport Town Park	No - Construction Stage will be complete
Activity	Public Road works	Yes – Potentially
Activity	Public Water works	No – no works planned
Activity	Forestry	Yes – ongoing in the area
Activity	Agriculture	Yes – ongoing in the area
Activity	Turf-Cutting	Yes – ongoing in the area

POTENTIAL IMPACT PATHWAYS SCOPED IN FOR EVALUATION		
SAC Pathway 1:	Direct effects to Qualifying Interest habitats of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC	Construction Stage
SAC Pathway 2:	Indirect Effects to Qualifying Interest habitats of an SAC Site (i.e. via reductions in water quality or spread of invasive species) within the SAC	Construction Stage
SAC Pathway 3:	Indirect Effects to Qualifying Interest habitats, of an SAC Site (i.e. via reductions in water quality or spread of invasive species) ex-situ the SAC	Construction Stage
SAC Pathway 4:	Direct effects to Qualifying Interest species of an SAC Site (i.e. mortality) within or ex-situ the SAC	Construction Stage
SAC Pathway 5:	Indirect effects to Qualifying Interest species of an SAC Site (i.e. disturbance /displacement) within the SAC	Construction Stage
SAC Pathway 6:	Indirect effects to Qualifying Interest species of an SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) within the SAC	Construction Stage
SAC Pathway 7:	Indirect effects to Qualifying Interest species of the SAC Site (i.e. disturbance /displacement) ex-situ to the SAC	Construction Stage
SAC Pathway 8:	Indirect effects to Qualifying Interest species of the SAC Site (i.e. habitat loss, fragmentation, degradation, loss/reduction in connectivity) ex-situ the SAC	Construction Stage
SPA Pathway 1:	Direct effects to Special Conservation Interest Species within an SPA (i.e. Disturbance, Mortality)	Construction Stage
SPA Pathway 2:	Indirect effects to Special Conservation Interest Species within an SPA (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or reduction/loss of connectivity, or through a reduction in prey item species)	Construction Stage
SPA Pathway 3:	Indirect effects to Special Conservation Interest Species ex-situ an SPA (i.e. Secondary effects on suitable habitat via habitat loss, degradation, fragmentation or loss/reduction in connectivity, reductions in prey item species, or through disturbance or mortality effects to Special Conservation Interest bird species outside their respective SPA).	Construction Stage

TABLE 3: SCOPING OF OTHER PROJECTS & ACTIVITIES WHICH OCCUR WITHIN BOTH GEOGRAPHICAL AND TIMEFRAME BOUNDARIES

Other Project/Activity	Scoped In/Out	Justification for Scoping in/out:
Other Project No. 3: Bunkimalta Windfarm & Grid Connection Other Project No. 4: Castlewaller Windfarm & Grid Connection	Scoped In	Although neither of these windfarms are likely to be constructed during the same period as UWF Grid Connection (because the Castlewaller Windfarm has not yet been offered a grid connection from EirGrid, and because of planning issues in relation to Bunkimalta Windfarm), there is *some possibility* that these windfarms **or their respective Grid Connection** could be built during the same period as UWF Grid Connection, and therefore these projects are included on a precautionary basis
Other Project No.5 Milestone Windfarm	Scoped In	Scoped in based on the *potential* for 2 remaining permitted turbines to be constructed during the same period, and due to the potential for disturbance/displacement of Hen Harrier during operation to act in combination.
Other Project No.10: Rear Cross Quarry	Scoped In	Scoped in due to proximity/location within an SPA under consideration
Other Project No. 14 Thurles Regional Water Treatment Works	Scoped Out	Under Construction at present – unlikely to cause cumulative effects at the end of the construction period for the Treatments Works (2021). Substantial separation distance/buffer. Likely Significant effects in combination are screened out.
Other Project No. 16: Forestry entrance works at Cappamore Other Project No. 17: Forestry entrance works at CummerBeg	Scoped Out	None of these projects are of a large enough scale to cause any measurable cumulative effects with UWF Grid Connection or the Whole UWF Project in respect of European Sites. Likely Significant effects in combination are reasonably screened out.
Other Project No.20: Biorefinery Plant, Thurles	Scoped Out	Due to the separation distance of this project from either the UWF Grid Connection or the Other Elements of the Whole UWF Projects, and the assimilative and dilution factors in downstream waterbodies, this project is not likely to cause any measurable cumulative effects with UWF Grid Connection or the Whole UWF Project to downstream European Sites.
Activity: Public Road Works	Scoped Out	UWF Grid Connection 110kV UGC works will not take place at the same time as any public authority works, likely Significant effects in combination are reasonably screened out.
Activity: Forestry Activity: Agriculture Activity: Turf-Cutting	Scoped In	While these activities are on-going and form part of the baseline conditions, they are identified as sources of impacts to European Sites and are scoped in accordingly.

TABLE 4: FURTHER SCOPING OF OTHER UNRELATED PROJECTS FOR STAGE 2: NATURA IMPACT STATEMENT

Other Project	Justification for Scoping in/out:
Rear Cross Quarry	Lower River Shannon SAC: SCOPED IN Lower River Suir SAC: *Scoped out – no hydrological connectivity* Clare Glen SAC: SCOPED IN Slievefelim to Silvermines Mountain SPA: SCOPED IN
Milestone Windfarm	Lower River Shannon SAC: *Scoped out – no hydrological connectivity* Lower River Suir SAC: SCOPED IN Clare Glen SAC: *Scoped out – no hydrological connectivity* Slievefelim to Silvermines Mountain SPA: SCOPED IN
Potential Castlewaller Windfarm	Lower River Shannon SAC: SCOPED IN Lower River Suir SAC: *Scoped out – no hydrological connectivity* Clare Glen SAC: SCOPED IN Slievefelim to Silvermines Mountain SPA: SCOPED IN
Potential Bunkimalta Windfarm	Lower River Shannon SAC: SCOPED IN Lower River Suir SAC: *Scoped out – no hydrological connectivity* Clare Glen SAC: SCOPED IN Slievefelim to Silvermines Mountain SPA: SCOPED IN
Forestry Agriculture Turf-Cutting	Lower River Shannon SAC: SCOPED IN Lower River Suir SAC: SCOPED IN Clare Glen SAC: SCOPED IN Slievefelim to Silvermines Mountain SPA: SCOPED IN

APPENDIX 2021 A3:
HEN HARRIER SURVEY DATA
UPPERCHURCH WINDFARM 2019 & 2020

TO

APPROPRIATE ASSESSMENT REPORT 2021

FOR

PROPOSED LARGER TURBINES AND MET MASTS
AT THE AUTHORISED UPPERCHURCH WINDFARM, CO TIPPERARY

Table 1: Details of timing, duration and weather conditions for UWF vantage point surveys undertaken during the breeding season in 202 0

VP Name	Date	Obse rver	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	15/04/2020	DD	None	0/8	>20	F1	SE	12	11:30	14:30	10800
1	15/04/2020	DD	None	2/8	>20	F2	SE	14	15:00	18:00	10800
1	25/05/2020	BQ	Dry	4/8	16	F3	S	14	10:33	16:33	21600
1	02/06/2020	BQ	Dry	1/8	16	F2	NW	17	09:52	15:52	21600
1	02/07/2020	BQ	Dry	1/8	16	F2	NW	13	09:12	15:15	21600
1	05/08/2020	BQ	Heavy Showers	8/8	1	F3	SE	17	08:55	14:55	21600
1	04/09/2020	BQ	Constant	8/8	2	F3	SW	15	08:30	14:30	21600
2	16/04/2020	DD	None	3/8	10	F1	NE	10	10:00	13:00	10800
2	16/04/2020	DD	None	2/8	10	F1	NE	13	13:30	16:30	10800
2	06/05/2020	AC	None	3/8	>20	F1	SE	12	10:00	13:00	10800
2	06/05/2020	AC	None	2/8	>20	F1	SE	16	13:30	16:30	10800
2	03/06/2020	BQ	Dry	8/8	16	F5	N	14	09:27	15:27	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
2	01/07/2020	BQ	Dry	8/8	16	F1	NW	12	08:51:00	14:51:00	21600
2	04/08/2020	BQ	Drizzle/rain	8/8	5	F5	SE	17	09:10	15:10	21600
2	01/09/2020	BQ	Drizzle	8/8	2	F3	SSE	13	08:30	14:30	21600
3	17/04/2020	DD	None	2/8	9	F2	SE	9	10:30	13:30	10800
3	17/04/2020	DD	None	8/8	15	F3	SE	12	14:00	17:00	10800
3	13/05/2020	AC	None	8/8	10	F2	NE	9	10:00	13:00	10800
3	13/05/2020	AC	None	6/8	10	F2	NE	10	13:30	16:30	10800
3	30/06/2020	BQ	Dry	8/8	16	F1	S	11	09:18	15:20	21600
3	07/07/2020	BQ	Constant	8/8	5	F2	SE	12	09:09	15:10	21600
3	06/08/2020	BQ	Dry	7/8	10	F2	SE	15	08:55	14:55	21600
3	02/09/2020	BQ	Drizzle	8/8	3	F3	SSE	14	08:30	14:30	21600
4	17/04/2020	AC	None	8/8	20	F1	E	12	10:30	13:30	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
4	17/04/2020	AC	None	7/8	20	F2	E	13	14:00	17:00	10800
4	25/05/2020	AC	None	5/8	>20	F2	S	14	11:00	14:00	10800
4	25/05/2020	AC	None	7/8	>20	F2	SW	16	14:00	17:00	10800
4	04/06/2020	BQ	Light rain	8/8	15	F4	NW	10	09:58	15:58	21600
4	10/07/2020	BQ	Dry	5/8	16	F4	NW	11	09:10	15:10	21600
4	11/09/2020	BQ	Drizzle	6/8	5	F4	SW	15	08:30	14:30	21600
4	30/09/2020	BQ	Constant	8/8	<1	F5	SW	5	08:30	14:30	21600
5	17/04/2020	NC	Dry/None	5/8	>20	F1	E	11	09:15	13:00	13500
5	22/04/2020	AC	None	1/8	20	F1	NE	12	10:45	13:00	8100
5	29/05/2020	AC	None	6/8	15	F1	SE	17	09:25	12:25	10800
5	29/05/2020	AC	None	6/8	15	F1	SE	19	12:25	15:25	10800
5	09/06/2020	BQ	Dry	8/8	16	F2	NW	9	09:25	15:25	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
5	08/07/2020	BQ	Dry	8/8	5	F2	NW	13	09:11	15:15	21600
5	11/08/2020	BQ	Dry	6/8	5	F2	NW	15	09:00	15:00	21600
5	03/09/2020	BQ	Drizzle	8/8	5	F2	WSW	14	08:30	14:30	21600
6	15/04/2020	NC	Dry/None	0/8	>20	F1	ESE	16	10:45	15:30	17100
6	17/04/2020	NC	Dry/None	7/8	15	F1	E	13	13:15	14:30	4500
6	18/05/2020	NC	Showers	8/8	18	F2	SSW	11	09:10	14:10	18000
6	19/05/2020	NC	None	8/8	>20	F2	SW	14	09:15	10:15	3600
6	10/06/2020	BQ	Dry	7/8	16	F1	NW	11	09:20	15:20	21600
6	14/07/2020	BQ	Dry	6/8	13	F3	NW	13	09:00	15:00	21600
6	12/08/2020	BQ	Dry	8/8	<1	F2	W	15	09:00	15:00	21600
6	07/09/2020	BQ	Constant	8/8	2	F3	WSW	16	08:30	14:30	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
7	16/04/2020	NC	Dry/None	2/8	>20	F1	ENE	9	10:30	15:30	18000
7	17/04/2020	NC	Dry/None	8/8	>20	F2	E	14	14:40	15:40	3600
7	19/05/2020	NC	None	8/8	>20	F1	SW	14	10:30	14:30	14400
7	20/05/2020	NC	None	4/8	>20	F2	SSE	17	12:40	14:40	7200
7	11/06/2020	BQ	Drizzle	8/8	16	F4	NE	12	09:22	15:22	21600
7	24/07/2020	BQ	Drizzle/rain	8/8	5	F3	S	15	09:40	15:40	21600
7	13/08/2020	BQ	Dry	8/8	<1	F2	N	18	09:15	15:15	21600
7	08/09/2020	BQ	Heavy Showers	8/8	1	F3	SW	14	08:30	14:30	21600
8	16/04/2020	SD	None	1/8	5	F1	SE	17	13:00	19:00	21600
8	20/05/2020	NC	None	3/8	>20	F2	SSE	13	09:20	12:20	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
8	29/05/2020	NC	None	1/8	>20	F2	SE	16	09:07	12:07	10800
8	16/06/2020	BQ	Light rain	8/8	>5	F2	NW	14	09:18	15:20	21600
8	30/07/2020	BQ	Drizzle/rain	8/8	5	F4	SSE	16	09:00	15:00	21600
8	31/08/2020	BQ	Dry	1/8	15	F3	SSE	5	08:30	14:30	21600
8	09/09/2020	BQ	Dry	1/8	10	F3	SW	13	08:30	14:30	21600
9	20/04/2020	AC	None	1/8	15	F1	E	12	10:30	13:30	10800
9	20/04/2020	AC	Light drizzle	1/8	15	F1	NE	15	14:00	17:00	10800
9	11/05/2020	NC	None	7/8	>20	F2	NE	8	10:30	14:30	14400
9	29/05/2020	NC	None	4/8	>20	F2	SSE	19	12:23	14:23	7200
9	22/06/2020	BQ	Dry	8/8	16	F3	SE	13	09:06	15:10	21600
9	28/07/2020	BQ	Dry	3/8	16	F3	NW	13	09:15	15:15	21600
9	14/08/2020	BQ	Dry	8/8	1	F3	NNE	17	08:05	14:05	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
9	10/09/2020	BQ	Drizzle	8/8	5	F3	SW	13	08:30	14:30	21600
10	15/04/2020	SD	None	0/8	5	F1	SE	16	11:00	17:30	23400
10	30/04/2020	NC	Heavy Showers	8/8	15	F2	WNW	9	11:30	16:30	18000
10	11/05/2020	NC	None	4/8	>20	F2	NE	10	14:45	15:45	3600
10	29/06/2020	BQ	Heavy rain	8/8	>5	F5	W	12	09:00	15:00	21600
10	29/07/2020	BQ	Drizzle/rain	8/8	10	F2	SSE	11	09:00	15:00	21600
10	21/08/2020	BQ	Heavy Showers	8/8	5	F6	S	15	09:15	15:15	21600
10	14/09/2020	BQ	Drizzle	8/8	8	F2	WSW	14	08:30	14:30	21600

Table 2: Details of UWF Hen Harrier sightings and the habitats over which the birds were observed from vantage point surveys undertaken during the breeding season in 2020

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP1	15/04/2020	Nil Sightings																	
VP1	25/05/2020	Nil Sightings																	
VP1	02/06/2020	Hen Harrier	Male	10:46	50				20								50		120
VP1	02/06/2020	Hen Harrier	Female	12:55	20														20
VP1	02/07/2020	Nil Sightings																	
VP1	05/08/2020	Nil Sightings																	
VP1	04/09/2020	Nil Sightings																	
VP2	16/04/2020	Nil Sightings																	
VP2	06/05/2020	Nil Sightings																	
VP2	03/06/2020	Nil Sightings																	
VP2	01/07/2020	Nil Sightings																	
VP2	04/08/2020	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF 1	NF 2	NF 3	NF 4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP2	01/09/2020	Nil Sightings																	
VP3	17/04/2020	Hen Harrier	Male	11:05														7	7
VP3	13/05/2020	Nil Sightings																	
VP3	30/06/2020	Nil Sightings																	
VP3	07/07/2020	Nil Sightings																	
VP3	06/08/2020	Nil Sightings																	
VP3	02/09/2020	Nil Sightings																	
VP4	17/04/2020	Nil Sightings																	
VP4	25/05/2020	Nil Sightings																	
VP4	04/06/2020	Nil Sightings																	
VP4	10/07/2020	Nil Sightings																	
VP4	11/09/2020	Nil Sightings																	
VP4	30/09/2020	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF 1	NF 2	NF 3	NF 4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP5	17/04/2020	Nil Sightings																	
VP5	22/04/2020	Nil Sightings																	
VP5	29/05/2020	Nil Sightings																	
VP5	09/06/2020	Nil Sightings																	
VP5	08/07/2020	Nil Sightings																	
VP5	11/08/2020	Nil Sightings																	
VP5	03/09/2020	Nil Sightings																	
VP6	15/04/2020	Hen Harrier	Ringtail	14:33	18														18
VP6	17/04/2020	Nil Sightings																	
VP6	18/05/2020	Nil Sightings																	
VP6	19/05/2020	Nil Sightings																	
VP6	10/06/2020	Nil Sightings																	
VP6	14/07/2020	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF 1	NF 2	NF 3	NF 4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP6	12/08/2020	Nil Sightings																	
VP6	07/09/2020	Nil Sightings																	
VP7	16/04/2020	Nil Sightings																	
VP7	17/04/2020	Nil Sightings																	
VP7	19/05/2020	Nil Sightings																	
VP7	20/05/2020	Nil Sightings																	
VP7	11/06/2020	Nil Sightings																	
VP7	24/07/2020	Nil Sightings																	
VP7	13/08/2020	Nil Sightings																	
VP7	08/09/2020	Nil Sightings																	
VP8	16/04/2020	Nil Sightings																	
VP8	20/05/2020	Nil Sightings																	
VP8	29/05/2020	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF 1	NF 2	NF 3	NF 4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP8	16/06/2020	Nil Sightings																	
VP8	30/07/2020	Nil Sightings																	
VP8	31/08/2020	Nil Sightings																	
VP8	09/09/2020	Nil Sightings																	
VP9	20/04/2020	Nil Sightings																	
VP9	11/05/2020	Nil Sightings																	
VP9	29/05/2020	Nil Sightings																	
VP9	22/06/2020	Nil Sightings																	
VP9	28/07/2020	Nil Sightings																	
VP9	14/08/2020	Nil Sightings																	
VP9	10/09/2020	Nil Sightings																	
VP10	15/04/2020	Nil Sightings																	
VP10	30/04/2020	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF 1	NF 2	NF 3	NF 4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP10	11/05/2020	Nil Sightings																	
VP10	29/06/2020	Nil Sightings																	
VP10	29/07/2020	Nil Sightings																	
VP10	21/08/2020	Nil Sightings																	
VP10	14/09/2020	Nil Sightings																	

Table 3: Details of Bird sightings and the habitats over which the birds were observed from vantage point surveys undertaken during the breeding season in 2020

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP1	15/04/2020	Buzzard		12:32		140													140
VP1	15/04/2020	Raven		12:32		140													140
VP1	15/04/2020	Kestrel		13:24		18													18
VP1	15/04/2020	Raven		13:34		39													39
VP1	15/04/2020	Raven		13:50		58													58
VP1	15/04/2020	Raven		15:32		31													31
VP1	25/05/2020	Raven		13:15	20				10										30
VP1	25/05/2020	Buzzard		15:02	10												40		50
VP1	02/06/2020	Buzzard		10:33	9												1		10
VP1	02/06/2020	Buzzard		11:30	50												10		60
VP1	02/06/2020	Kestrel		12:49	30				10										40

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP1	02/07/2020	Kestrel		11:11	30														30
VP1	02/07/2020	Buzzard		11:15	20														20
VP1	05/08/2020	Kestrel		12:32	60														60
VP1	04/09/2020	Raven		10:46	30														30
VP1	04/09/2020	Kestrel		12:25	60														60
VP2	16/04/2020	Raven		13:40		20												11	31
VP2	16/04/2020	Raven		14:33		27													27
VP2	16/04/2020	Raven		15:20		11													11
VP2	06/05/2020	Nil Sightings																	
VP2	03/06/2020	Nil Sightings																	
VP2	01/07/2020	Nil Sightings																	
VP2	04/08/2020	Kestrel		13:20														60	60
VP2	01/09/2020	Raven		10:14	30														30

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP2	01/09/2020	Kestrel		12:16	20													40	60
VP3	17/04/2020	Raven		11:11		12													12
VP3	17/04/2020	Raven		11:30		27													27
VP3	17/04/2020	Grey Heron		11:53		37													37
VP3	17/04/2020	Raven		13:14		28													28
VP3	17/04/2020	Raven		14:33		27													27
VP3	13/05/2020	Nil Sightings																	
VP3	30/06/2020	Buzzard		13:27	180														180
VP3	07/07/2020	Nil Sightings																	
VP3	06/08/2020	Nil Sightings																	
VP3	02/09/2020	Kestrel		10:06	30														30
VP3	02/09/2020	Raven		11:43	40													20	60
VP4	17/04/2020	Buzzard		12:44	43														43

VP Name	Date	Species	Sex	Time of sighting	G	RG	H B	D E	G O	C F	NF 1	NF 2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP4	25/05/2020	Nil Sightings																	
VP4	04/06/2020	Nil Sightings																	
VP4	10/07/2020	Kestrel		10:45	60														60
VP4	10/07/2020	Buzzard		12:30														40	40
VP4	10/07/2020	Buzzard		13:04	60													60	120
VP4	10/07/2020	Raven		14:26	60														60
VP4	11/09/2020	Buzzard		09:16	60														60
VP4	11/09/2020	Kestrel		10:24	30														30
VP4	30/09/2020	Nil Sightings																	
VP5	17/04/2020	Raven		09:41	9														9
VP5	17/04/2020	Golden Plover		10:22	74														74
VP5	17/04/2020	Kestrel	Male	10:30	14														14
VP5	22/04/2020	Raven		12:57		18													18

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP5	29/05/2020	Raven		10:04		21													21
VP5	29/05/2020	Raven		12:37		28													28
VP5	29/05/2020	Raven		13:19		13													13
VP5	09/06/2020	Kestrel		10:37	20														20
VP5	09/06/2020	Buzzard		12:50	30													30	60
VP5	08/07/2020	Kestrel		11:45	60														60
VP5	11/08/2020	Kestrel		10:42	30														30
VP5	03/09/2020	Buzzard		09:15	10													20	30
VP5	03/09/2020	Raven		11:34	30														30
VP5	03/09/2020	Raven		13:27	30														30
VP6	15/04/2020	Kestrel	Male	13:22	128														128
VP6	15/04/2020	Raven		14:20	257														257

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP6	15/04/2020	Kestrel	Male	14:45	48														48
VP6	15/04/2020	Kestrel	Male	14:54	272														272
VP6	17/04/2020	Kestrel	Male	13:15	129														129
VP6	17/04/2020	Kestrel	Male	13:21	153														153
VP6	17/04/2020	Golden Plover		13:34	84														84
VP6	18/05/2020	Grey Heron		11:17	47														47
VP6	19/05/2020	Nil Sightings																	
VP6	10/06/2020	Nil Sightings																	
VP6	14/07/2020	Kestrel		10:49	180														180
VP6	12/08/2020	Nil Sightings																	
VP6	07/09/2020	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP7	16/04/2020	Raven		11:51	76														76
VP7	16/04/2020	Raven		12:20	72														72
VP7	16/04/2020	Raven		12:25	159														159
VP7	16/04/2020	Kestrel		13:46	217														217
VP7	16/04/2020	Kestrel		13:50	169														169
VP7	17/04/2020	Kestrel	Male	14:54	157														157
VP7	19/05/2020	Nil Sightings																	
VP7	20/05/2020	Raven		13:44	90														90
VP7	11/06/2020	Nil Sightings																	
VP7	24/07/2020	Kestrel		12:28	60														60
VP7	13/08/2020	Kestrel		13:30	60														60

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP7	13/08/2020	Kestrel		14:16	50				10										60
VP7	08/09/2020	Kestrel		10:06	20														20
VP7	08/09/2020	Kestrel		12:46	60														60
VP7	08/09/2020	Kestrel		13:34	60														60
VP8	16/04/2020	Kestrel		14:48			17												17
VP8	16/04/2020	Buzzard		15:56															20
VP8	16/04/2020	Buzzard		17:07															24
VP8	20/05/2020	Raven		09:36	97														97
VP8	20/05/2020	Raven		09:56	49														49
VP8	20/05/2020	Buzzard		10:13	292														292
VP8	29/05/2020	Nil Sightings																	
VP8	16/06/2020	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP8	30/07/2020	Kestrel		12:01	60														60
VP8	31/08/2020	Kestrel		10:26	20													10	30
VP8	09/09/2020	Raven		09:48	30														30
VP8	09/09/2020	Buzzard		13:07	10													50	60
VP9	20/04/2020	Raven		12:44		12													12
VP9	20/04/2020	Nil Sightings																	
VP9	11/05/2020	Kestrel		11:29	71														71
VP9	11/05/2020	Buzzard		14:03	83														83
VP9	29/05/2020	Nil Sightings																	
VP9	22/06/2020	Buzzard		12:45	30														30
VP9	28/07/2020	Kestrel		10:16	30														30
VP9	28/07/2020	Kestrel		10:34	30														30

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP9	28/07/2020	Kestrel		11:17	10														10
VP9	28/07/2020	Kestrel		13:18	20														20
VP9	28/07/2020	Kestrel		15:00	20														20
VP9	14/08/2020	Kestrel		11:24	30														30
VP9	14/08/2020	Kestrel		13:45	60														60
VP9	10/09/2020	Kestrel		10:06	60														60
VP9	10/09/2020	Raven		13:43	30														30
VP10	15/04/2020	Kestrel		11:15															5
VP10	15/04/2020	Raven		11:21															13
VP10	15/04/2020	Buzzard		11:40															720
VP10	15/04/2020	Buzzard		12:48															480
VP10	30/04/2020	Kestrel		12:50	98														98
VP10	30/04/2020	Raven		14:49	28														28

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP10	30/04/2020	Grey Heron		15:12	12														12
VP10	30/04/2020	Raven		16:02	26														26
VP10	11/05/2020	Nil Sightings																	
VP10	29/06/2020	Nil Sightings																	
VP10	29/07/2020	Nil Sightings																	
VP10	21/08/2020	Raven		10:30	30														30
VP10	21/08/2020	Raven		14:14	30													30	60
VP10	14/09/2020	Kestrel		09:48	60														60
VP10	14/09/2020	Raven		11:52	20													10	30
VP10	14/09/2020	Raven		12:36	30														30

Table 4: Details of timing, duration and weather conditions for UWF vantage point surveys undertaken during the breeding season in 2020

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	12/04/2019	TK	Dry	3/8	3	F2	SE	9	10:40	13:40	10800
1	12/04/2019	TK	Dry	3/8	3	F2	SE	12	14:10	17:10	10800
1	31/07/2019	JP	Dry	7/8	15	F2	W	14	09:16	12:16	10800
1	31/07/2019	JP	Dry	8/8	15	F3	SW	17	12:46	15:46	10800
2	18/04/2019	TK	Dry	3/8	3	F2	SE	14	10:40	13:40	10800
2	18/04/2019	TK	Dry	3/8	3	F2	SE	18	14:10	17:10	10800
2	10/07/2019	JP	Dry	8/8	5	F2	S	17	09:16	12:16	10800
2	10/07/2019	JP	Dry	8/8	5	F3	SW	21	12:46	15:46	10800
3	08/04/2019	TK	Dry	5/8	3	F1	E	13	10:50	13:50	10800
3	08/04/2019	TK	Dry	5/8	3	F1	E	13	14:20	17:20	10800
3	24/07/2019	TK	None	5/8	3	F2	SE	17	9:10	12:10	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
3	24/07/2019	TK	None	5/8	3	F2	SE	20	12:40	15:40	10800
4	19/04/2019	TK	Dry	2/8	3	F2	SE	13	10:55	13:55	10800
4	19/04/2019	TK	Dry	2/8	3	F2	SE	19	14:25	17:25	10800
4	31/07/2019	TK	Dry	5/8	3	F2	W	14	8:10	11:10	10800
4	31/07/2019	TK	Dry	5/8	3	F2	W	17	11:40	14:40	10800
5	20/04/2019	TK	Dry	2/8	3	F1	W	12	10:50	13:50	10800
5	20/04/2019	TK	Dry	2/8	3	F1	W	19	14:20	17:20	10800
5	29/07/2019	TK	None	7/8	3	F2	NW	18	11:00	14:00	10800
5	29/07/2019	TK	None	7/8	3	F2	NW	18	14:30	17:30	10800
6	27/04/2019	TK	Dry	5/8	3	F3	W	8	11:05	14:05	10800
6	27/04/2019	TK	Dry	5/8	3	F2	W	11	14:35	17:35	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
6	19/07/2019	DOC	Heavy Showers	7/8	15	F3	SW	19	10:38	13:38	10800
6	19/07/2019	DOC	Heavy Showers	7/8	15	F3	SW	19	14:08	17:08	10800
7	25/04/2019	TK	Dry	7/8	2	F2	SE	12	11:00	14:00	10800
7	25/04/2019	TK	Dry	7/8	2	F2	SW	15	14:30	17:30	10800
7	17/07/2019	DOC	Heavy Showers	8/8	15	F4	SW	20	10:58	13:58	10800
7	17/07/2019	DOC	Heavy Showers	8/8	15	F4	SW	20	14:28	17:28	10800
8	17/04/2019	TK	None	8/8	2	F2	SE	11	10:30	13:30	10800
8	17/04/2019	TK	None	7/8	2	F2	SE	14	14:00	17:00	10800
8	25/07/2019	TK	Single shower	8/8	3	F3	SE	18	8:55	11:55	10800
8	25/07/2019	TK	Single shower	8/8	3	F3	SE	21	12:30	15:30	10800
9	11/04/2019	TK	Dry	4/8	3	F2	SE	12	10:45	13:45	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
9	11/04/2019	TK	Dry	4/8	3	F2	SE	12	14:15	17:15	10800
9	26/07/2019	TK	Single shower	7/8	3	F3	SW	17	9:05	12:05	10800
9	26/07/2019	TK	None	7/8	3	F3	SW	18	12:50	15:50	10800
10	26/04/2019	TK	Single shower	8/8	2	F3	W	9	9:15	12:15	10800
10	26/04/2019	TK	Occasional showers	8/8	2	F3	W	11	12:45	15:45	10800
10	11/07/2019	JP	Dry	7/8	10	F3	W	18	12:39	15:39	10800
10	11/07/2019	JP	Misty	8/8	5	F3	W	16	09:09	12:09	10800

Table 5: Details of UWF Hen Harrier sightings and the habitats over which the birds were observed from vantage point surveys undertaken during the breeding season in 2019

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF 1	NF 2	NF 3	NF 4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP1	12/04/2019	Nil Sightings																	
VP1	31/07/2019	Hen Harrier	Female	9:41	9														9
VP2	18/04/2019	Nil Sightings																	
VP2	10/07/2019	Nil Sightings																	
VP3	08/04/2019	Nil Sightings																	
VP3	24/07/2019	Nil Sightings																	
VP4	19/04/2019	Nil Sightings																	
VP4	31/07/2019	Nil Sightings																	
VP5	20/04/2019	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF 1	NF 2	NF 3	NF 4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP5	29/07/2019	Nil Sightings																	
VP6	27/04/2019	Hen Harrier	Male	12:33		156													156
VP6	19/07/2019	Nil Sightings																	
VP7	25/04/2019	Nil Sightings																	
VP7	17/07/2019	Nil Sightings																	
VP8	17/04/2019	Nil Sightings																	
VP8	25/07/2019	Nil Sightings																	
VP9	11/04/2019	Nil Sightings																	
VP9	26/07/2019	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF 1	NF 2	NF 3	NF 4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP10	26/04/2019	Hen Harrier	Male	10:26		35													35
VP10	11/07/2019	Nil Sightings																	

Table 6: Details of Bird sightings and the habitats over which the birds were observed from vantage point surveys undertaken during th e breeding season in 2019

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP1	12/04/2019	Raven	Male/Female	11:36		23												12	35
VP1	12/04/2019	Kestrel	Male	14:47		48													48
VP1	12/04/2019	Herring Gull	Male/Female	15:12	136														136
VP1	31/07/2019	Kestrel	Female	9:50	12														12
VP1	31/07/2019	Kestrel	Female	10:48	28														28
VP1	31/07/2019	Kestrel	Female	10:50	3														3
VP1	31/07/2019	Kestrel	Female	10:54	24														24
VP1	31/07/2019	Kestrel	Female	11:13	14														14
VP1	31/07/2019	Kestrel	Female	11:17	22														22
VP1	31/07/2019	Kestrel	Female	12:48	127														127

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP1	31/07/2019	Raven		13:01														10	19
VP1	31/07/2019	Kestrel	Female	14:53	24														24
VP2	18/04/2019	Kestrel	Male	12:18		225													225
VP2	18/04/2019	Kestrel	Male	15:25		85													85
VP2	18/04/2019	Raven	Male/Female	15:58		55													55
VP2	18/04/2019	Kestrel	Male	17:02		62													62
VP2	10/07/2019	Nil Sightings																	
VP3	08/04/2019	Raven	Male/Female	11:33	45														45
VP3	08/04/2019	Raven	Male/Female	14:40	38														38
VP3	08/04/2019	Buzzard	Male/Female	15:25	265														265
VP3	08/04/2019	Grey Heron	Male/Female	15:54	55														55

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP3	24/07/2019	Kestrel	Female	11:58	134														134
VP3	24/07/2019	Kestrel	Female	13:25	70														70
VP4	19/04/2019	Raven	Male/Female	11:40		232													232
VP4	19/04/2019	Raven	Male/Female	11:55		20												35	55
VP4	19/04/2019	Raven	Male/Female	13:12		50												16	66
VP4	19/04/2019	Kestrel	Male	17:08		186													186
VP4	31/07/2019	Kestrel	Female	13:20	60														90
VP5	20/04/2019	Kestrel	Female	12:20		40													40
VP5	20/04/2019	Kestrel	Male	12:45		240													240
VP5	29/07/2019	Kestrel	Male	16:40	234														234

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP6	27/04/2019	Peregrine	Male	13:12		214													214
VP6	27/04/2019	Kestrel	Male	13:48		254													254
VP6	27/04/2019	Raven	Male/Female	15:20		185													185
VP6	19/07/2019	Raven		13:18	47														47
VP7	25/04/2019	Kestrel	Male	11:26		126													126
VP7	25/04/2019	Kestrel	Female	11:48		55													55
VP7	25/04/2019	Raven	Male/Female	16:12		75													75
VP7	25/04/2019	Raven	Male/Female	17:05		80													80
VP7	17/07/2019	Nil Sightings																	
VP8	17/04/2019	Raven	Male/Female	10:55														82	82
VP8	17/04/2019	Raven	Male/Female	15:22														50	50

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP8	17/04/2019	Buzzard	Male/Female	15:38														62	62
VP8	25/07/2019	Kestrel	Male	11:40	212					180								32	
VP8	25/07/2019	Sparrowhawk	Male	14:10	10													10	
VP8	25/07/2019	Grey Heron	Male/Female	14:18	155													85	
VP9	11/04/2019	Kestrel	Male	11:02		218													218
VP9	11/04/2019	Raven	Male/Female	12:20	55	40													95
VP9	11/04/2019	Kestrel	Male	14:48		46													46
VP9	11/04/2019	Sparrowhawk	Male	16:12		20													20
VP9	26/07/2019	Buzzard	Male/Female	14:11	72														72

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/F2	2nd F3	2nd F4	F	Duration (s)
VP9	26/07/2019	Buzzard	Male/Female	14:26	35														35
VP9	26/07/2019	Kestrel	Male	15:08	25														25
VP9	26/07/2019	Raven	Male/Female	15:40	50														50
VP10	26/04/2019	Raven	Male/Female	10:39		48													48
VP10	26/04/2019	Kestrel	Male	14:18		92													92
VP10	11/07/2019	Nil Sightings																	