REFERENCE DOCUMENTS for PROPOSED LARGER TURBINES AND MET MASTS AT UPPERCHURCH WINDFARM for EIAR 2021 and AA 2021

REFERENCE DOCUMENT 12 of 36

This document contains the following:

UWF Related Works (LA ref. 18/600913, ABP ref. ABP-303634-19)

- **2019 UWF Related Works Revised Environmental Management Plan – Volume D**
  - Tab 1 – Grant of Permission including Planning Conditions (post planning consent)
  - Tab 2 – Feedback (post planning consent) from consultations with Statutory Bodies and Other Parties
  - Tab 3 – Traffic Management Plan
  - Tab 4 – Surface Water Management Plan
  - Tab 5 – Invasive Species Management Plan
  - Tab 6 – Waste Management Plan
  - Tab 7 – Revised Best Practice Measures
  - Tab 8 – Outline Construction Methodologies for the UWF Related Works
  - Tab 9 – Construction Contract Documents (post planning consent / pre-construction)

UWF RELATED WORKS

VOLUME D

REVISED ENVIRONMENTAL MANAGEMENT PLAN

Revised January 2109

Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF DOCUMENTS TABBED TO THIS EMP

Tab No.	Document Title
Tab 1	Grant of Permission including Planning Conditions
Tab 2	Feedback from consultations with Statutory Bodies and Other Parties
Tab 3	Traffic Management Plan
Tab 4	Surface Water Quality Management Plan
Tab 5	Invasive Species Management Plan
Tab 6	Waste Management Plan
Tab 7	Best Practice Measures
Tab 8	Outline Construction Methodologies
Tab 9	Construction Contract Documents

1. Introduction to the EMP

This Revised Environmental Management Plan (EMP) has been prepared for the UWF Related Works and describes the approach to environmental management during the construction and early operational stages.

1.1. Objectives of the EMP

The objectives of the EMP are to:

(a) identify management responsibilities and reporting requirements for environmental management;
(b) identify the relevant Environmental Commitments;
(c) set out the environmental protection measures to be implemented;
(d) Outline how compliance with the EMP will be achieved; and
(e) Promote best environmental practices for the duration of the development.

1.2. Purpose of the EMP

The purpose of this document is to communicate environmental protection measures that apply to the development of the UWF Related Works to those with responsibility for carrying out works on site so that any likely significant adverse effects of the development on the receiving environment can be prevented.

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

1.2.1. Scope of the EMP

This EMP covers the construction and early operational stage (first 3 years) of the UWF Related Works.

1.2.1.1. Review and Update of the EMP

Planning consent for the UWF Related Works is currently being sought from the planning authority. Additional environmental requirements and environmental protection measures may be included in the conditions attached to the planning consent, should it be granted.

The EMP will also be supported by detailed Method Statements developed in the subsequent construction and operation stages.

The EMP is considered a dynamic document and as such will be reviewed and updated as required at both the commencement and throughout each stage of the UWF Related Works development to ensure it contains the latest relevant information, environmental commitments and environmental control measures.

1.3. Structure of the EMP

This EMP has been developed according to the NRA *Guidelines for the Creation and Maintenance of an Environmental Operating Plan* (2007), and is presented in distinct sections, as outlined in Table 1 below.

Table 1: Structure of the EMP

Section No.	Section Heading	Information provided in this section
Section 1	Introduction to the EMP	The objectives, purpose and scope of the EMP.
Section 2	General Project Description	An overview of the main elements of the UWF Related Works, including purpose and location, main construction activities and classification of works locations. An overview of the other elements of the Whole UWF Project and other Activities in the area is also included.
Section 3	Contractors & Personnel	An outline of the type of contractors and personnel who will be involved in the project, including duties and responsibilities of key personnel, the training which will be provided and communication procedures which will be put in place.
Section 4	Environmental Commitments	An outline of the Environmental Commitments for the project and the Reference Documents, from which the Environmental Commitments arise.
Section 5	Environmental Protection Measures	The Environmental Protection Measures (Mitigation Measures) by which the Environmental Commitments will be implemented, including Project Design Environmental Protection Measures, Management Plans, Scheduling of Works Requirements, Survey Requirements and Best Practice Measures, and the application of Environmental Protection Measures to different locations along the construction works areas.
Section 6	Emergency Response Measures	Environmental emergency response measures including contingency measures for fuel or oil spillages along construction works areas and significant pollution occurrence in local surface waters
Section 7	Monitoring	Monitoring of construction works by the Environmental Clerk of Works, and specialist environmental and engineering consultants
Section 8	Records & Reporting	Record forms and registers for compliance auditing, environmental training, environmental incidents and complaints.
Section 9	Mapping & Figures	Mapping and layouts of the UWF Related Works, including a table of the classification of the individual sections and locations along the construction works areas.

2. General Project Description

An overview of the UWF Related Works is provided below, the full description of the project is provided in Volume C Revised EIA Report for the UWF Related Works, Volume C2 Revised EIAR Main Report, Chapter 5: Description of Development – UWF Related Works.

The UWF Related Works proposal comprises of the following parts:

- Internal Windfarm Cabling
- Realigned Windfarm Roads
- Haul Route Roads
- Telecom Relay Pole
- RW Ancillary Works

2.1. Purpose of UWF Related Works

Internal Windfarm Cabling: to connect the Consented UWF Turbines to the Consented UWF Substation.
Realigned Windfarm Roads: to realign two lengths of Consented UWF Roads and to provide access to a new telecom relay pole.
Haul Route Works: to facilitate the haulage of turbine components to the Upperchurch Windfarm site.
Telecom Relay Pole: to be erected in order to carry telecoms relay equipment, which will mitigate communication links impacts from operational Consented UWF Turbines on the communication signals between Foilnaman Mast and Laghtseefin Mast. The Telecom Relay Pole will fulfil Condition No. 18 of the planning conditions associated with the Upperchurch Windfarm.
RW Ancillary Works: will facilitate the construction of the UWF Related Works.
Note: the Consented UWF Turbines, Consented UWF Roads and the Consented UWF Substation refer to components of Upperchurch Windfarm (UWF).

2.2. Location and overview description of UWF Related Works

The **Internal Windfarm Cabling** will connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables in agricultural; forestry lands; and across public roads; in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. Approximately 62% of the Internal Windfarm Cabling is located under Consented UWF Roads or Realigned Windfarm Roads, the remaining Cabling is located in the vicinity of the windfarm site.

The Internal Windfarm Cabling consists of electrical cables, communication cables and the copper conductor cables which are installed inside High Density Polyethylene (HDPE) ducting in underground trenches. Cable Protection and Warning Tapes will also be laid in the trench. The trench will be excavated, ducting and warning tapes installed and the 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.

The **Realigned Windfarm Roads** (labelled RWR on the mapping) are two sections of the already consented windfarm roads which require realignment and one length of new road to link a telecoms mast to the windfarm road. These changes are proposed for windfarm roads in agricultural and forestry lands in the townlands of Shevry, Knockmaroe, and Grousehall, which are all within the Upperchurch Windfarm site.

The **Haul Route Works** (labelled HW on the mapping), are proposed for public road verges, roadside boundaries and grassland fields located adjacent to the L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 and R503 roads 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; temporary removal or part-removal of roadside boundaries; opening of temporary entrances and the construction of temporary access roads on private lands.

The **Telecom Relay Pole** is an 18m wooden pole proposed for a location in Knockmaroe townland, close to the existing Foilnaman Mast. Laghtseefin Mast is 9.5km directly south. The Relay Pole will be contained within a small compound, and a low voltage power and communications supply will be provided from the existing Foilnaman Mast. A short length of access road, Realigned Windfarm Road No. RWR3, will provide access to the Telecom Relay Pole from the Consented UWF Road network.

RW Ancillary Works will facilitate the construction of the UWF Related Works and will include temporary access roads; temporary and permanent watercourse crossings (labelled WW on the mapping); temporary site entrances (labelled EW on the mapping); change of use from 'agriculture' to 'forestry and agriculture' at the UWF Replacement Forestry entrance at Foilnaman (labelled EW10 on the mapping); along with forestry felling; temporary and permanent hedgerow/tree removal; permanent hedgerow replanting; fencing; relocation of existing telephone poles and temporary storage of excavated materials; at various locations within construction works area boundaries.

Relevant EMP Figures:

Figure RW EMP 1: Location of UWF Related Works on OSI Discovery Mapping

Figure RW EMP 2: Layout of UWF Related Works on Aerial Photography Mapping

2.3. Main Construction Stage Activities

Construction stage activities will involve the following main works:

• Pre-Construction Activities	• Instream Works Preparation and Reinstatement
• Construction Works Area Preparation	• Instream Works
• Temporary Site Entrances	• Bailey Bridge
• Realigned Windfarm Roads	• Relocation of Overhead Lines
• Temporary Access Roads	• Felling of Forestry
• Haul Route Works	• Overburden Storage Berms
• Telecom Relay Pole	• Reinstatement of Land
• Internal Windfarm Cabling	

Individual Outline Construction Methodologies (OCMs) for all of the above listed main works and activities of UWF Related Works can be found at **Tab 8 of this EMP.** Further methodologies to be included post planning consent / pre-construction. In the OCMs, a brief description of the work involved; the duration of this work; personnel, machinery, equipment and tools requirements; construction materials; details of the standard methodology for the construction activities and any variations to those methods are also outlined. These OCMs are specific to each distinct body of work or activity. The final Method Statements for the construction works will be developed by the appointed Contractor and will be based on these OCMs, prior to construction.

2.4. Classification and Grouping of Works Locations for this EMP

In order to facilitate the monitoring and auditing of compliance with Environmental Commitments along various parts of the UWF Related Works during its construction, the construction works area boundary is broken down into individual sections (SW1 to SW84). In addition, watercourse crossing points, roads and joint bay locations are identified with individual number codes.

These sections, watercourse crossing locations, joint bay locations and road works locations are identified on Figure RW EMP 3: Layout of UWF Related Works, including Construction Works Areas and work Section Numbers on Aerial Photography Mapping in Section 9: Mapping and Figures of this EMP.

Section 5.7: Application of Environmental Protection Measures presents the Environmental Protection Measures applicable to each section/location and is based on landuse or distinguishing features of the location, which are:

- Watercourse Crossing Locations (Class 1 and 2, fisheries value)
- Watercourse Crossing Locations (Class 3 and 4, sub-optimal or no fisheries value)
- Public Roads
- Agricultural Lands
- Forestry Lands
- Existing Private Roads / Consented UWF Roads

2.5. Other Elements of the Whole UWF Project

The UWF Related Works is one part of a whole project, which is made up of five individual elements – the UWF Related Works, along with the Upperchurch Windfarm (UWF), UWF Grid Connection, UWF Replacement Forestry, and UWF Other Activities. These are collectively referred to as the Whole UWF Project in this EMP. The location of each element of the whole UWF project is illustrated on:

Relevant EMP Figures:

Revised Figure RW EMP 4: Location of the UWF Related Works and the Other Elements of the Whole UWF Project on OSI Mapping.

2.5.1. Cumulative Locational Context of all the Elements

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

The vast majority of the interaction of the Elements is in and around Upperchurch Windfarm.

The UWF Related Works is adjacent to and overlaps with Other Elements of the Whole UWF Project per:

- The majority of the Internal Windfarm Cabling overlaps the Consented UWF Roads,
- The Realigned Windfarm Roads will provide alternative access to Consented UWF Turbines,
- The Haul Route Works and Telecom Relay Pole are located in the immediate vicinity of various parts of the Upperchurch Windfarm
- The UWF Related Works overlap and are adjacent to the UWF Grid Connection and the Upperchurch Windfarm in Knocknabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands
- Haul Route Works are located adjacent to Haul Route Activities (UWF Other Activities) in the Knocknabansha/Knockmaroe area.

Relevant EMP Figures:

Figure RW EMP 5: UWF Related Works and the Other Elements of the Whole UWF Project in the vicinity of Upperchurch Windfarm.

Figure RW EMP 6: UWF Related Works and the Other Elements of the Whole UWF Project in Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands.

2.6. Other Activities in the vicinity of the UWF Related Works

Other activities at and in the immediate vicinity of the UWF Related Works are:

- Agriculture – mainly cattle rearing and silage cutting
- Forestry – felling activities, forestry management
- Walking – presence of walkers along waymarked trails
- Traffic – on public and private roads

3. Contractors & Personnel

A typical organisational structure, a format for Contact Details Sheets for the construction stage of the UWF Related Works, along with the duties and responsibilities of various personnel and a description of environmental training and communication processes are outlined below.

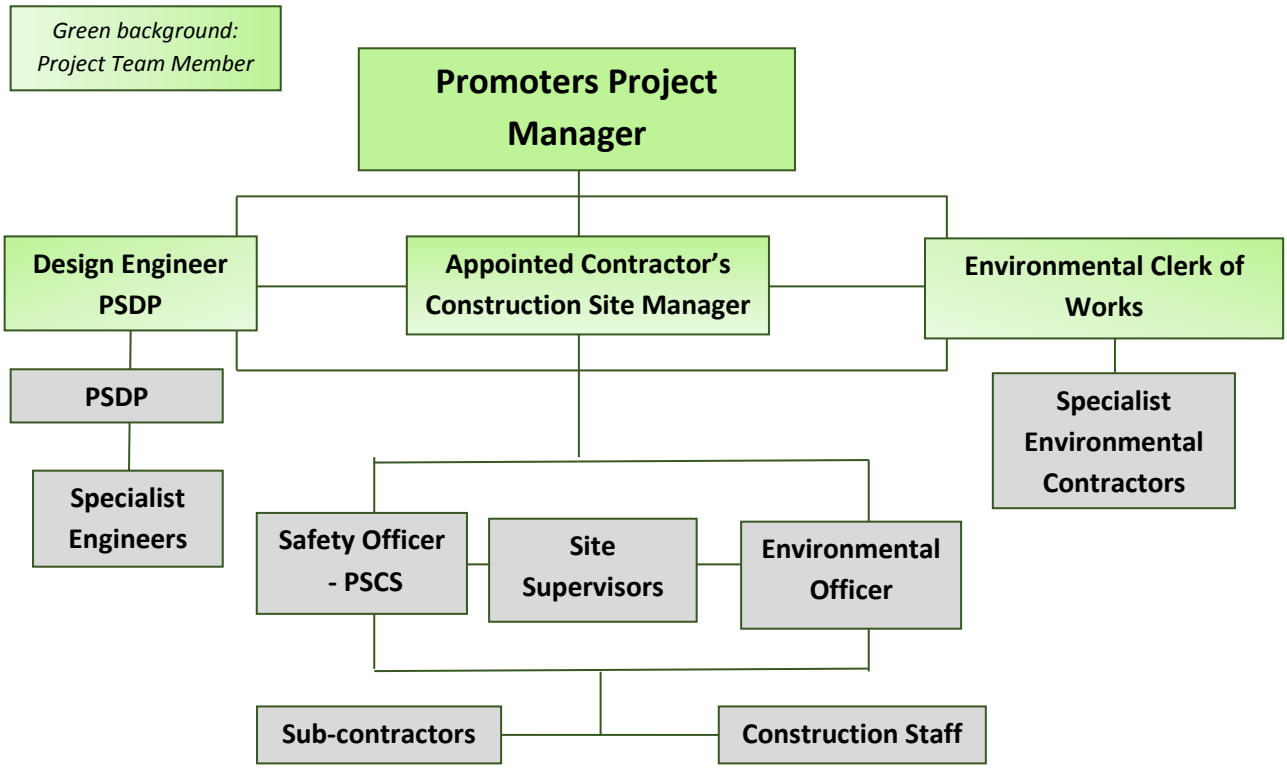
The construction Project Manager and Main Contractor will be appointed by the Promoter prior to commencement of the works. On appointment, the Project Manager and the Main Contractor will be required by the Project Promoter to update the outline organisational structure, the specific duties, roles and responsibilities of appointed personnel, contact details for these personnel, implement training programs and policies regarding communications.

It should be noted, that the contractors and personnel for the construction stage are also relevant to the pre-construction stage.

3.1. Organisational Structure and Hierarchy

The organogram below illustrates the typical reporting and hierarchal structures which will be implemented during the various stages of the UWF Related Works development. These organograms will inform the duties and responsibilities of all personnel under the EMP.

3.1.1. Construction Stage



3.2. Contact Details

Contact details of relevant personnel are provided in Tables 2 to 4 below to ensure the efficient reporting of environmental incidents. These tables will be populated following the appointment of the Contractor and the Project Team members, the details will be frequently reviewed by the Environmental Clerk of Works to ensure that they are up-to-date.

3.2.1. Construction Stage Contact Details

Table 2: Project Promoters Contacts

Position Title	Name	Mobile Phone Number	Email Address
Project Manager			
Design Engineer			
Environmental Clerk of Works			

Table 3: Main Contractors Contacts

Position Title	Name	Mobile Phone Number	Email Address
Construction Site Manager			
Environmental Officer			
Safety Manager – PSCS			
Safety Officers (24-hour number)			
Site Emergency Number (24-hour)			

Table 4: Third Party Contacts

Organisation	Position Title	Name	Phone Number	Email Address
Emergency Services				
Health & Safety Authority				
Tipperary County Council				
Tipperary County Council				
Inland Fisheries Ireland				
National Parks & Wildlife Service				
Environmental Protection Agency				
Arlo Group, Waste Management	Oil Spill Response Team			

3.3. Duties & Responsibilities

3.3.1. Project Promoter

The Project Promoter (the 'Project Promoter' or 'Promoter') of the UWF Related Works has overall responsibility for the implementation of the environmental commitments and of environmental management of the works during construction.

3.3.2. Project Team Members – Construction Stage

The project team will be appointed prior to the commencement of the construction stage. The roles and responsibilities outlined below are indicative at this stage in the project and will be updated pending planning consent, conditions of planning and the appointment of the Main Contractor, details of the personnel involved along with their responsibilities will be added to the EMP. An outline of potential duties and responsibilities for various members of the project team is provided below. These details will require revision prior to the commencement of construction.

3.3.2.1. Project Promoters Project Manager

A Project Manager is appointed by the Project Promoter to manage and oversee the entire project.
The Project Manager's responsibilities include, but are not limited to, the following:

- management of the construction project, including the production of a construction schedule and the procurement of construction materials;
- liaison with the Project Promoter;
- liaison with the Main Contractor, Construction Site Manager and Project Team;
- liaison with the Environmental Clerk of Works
- implementing of the Environmental Management Plan;
- implementing the EMP sub-plans, including the Safety and Health Plan;
- assigning duties and responsibilities in relation to the EMP;
- maintaining a site project diary.

3.3.2.2. Construction Site Manager

The Construction Site Manager manages all the works to construct the windfarm, on behalf of the Main Contractor. The Construction Site Manager reports to the Promoters Project Manager. In relation to the EMP, the Construction Site Manager is responsible for:

- Being aware of and familiar with all Environmental Commitments and Environmental Control Measures;
- Ensuring that all relevant information on project programming, timing, construction methodology, etc., is communicated to the Promoters Project Manager and to the Environmental Clerk of Works, in a timely and efficient manner, in order to allow pre-emptive actions relating to the environment to be taken where required;
- Ensuring that the Environmental Commitments are implemented;
- Ensuring that adequate resources are provided to design and install any environmental interventions;
- Liaising with the Design Engineer and providing information on environmental management to the Design Engineer during the course of the construction phase;

- Liaising with the Project Team in assigning duties and responsibilities in relation to the EMP to individual members of the main contractor's project staff;
- Preparing site-specific Method Statements for all Works activities where there is a risk of environmental damage, by incorporating relevant Environmental Control Measures;
- Liaising with the Environmental Clerk of Works in reviewing and updating site-specific Method Statements for all Works activities where Environmental Protection Measures had been altered, and
- Liaising with the Environmental Clerk of Works where third party agreement is required in relation to site-specific Method Statements and Environmental Control Measures.

3.3.2.3. Design Engineer

The Design Engineer reports to the Promoters Project Manager and is responsible for:

- Design of the Works;
- Reviewing and approving relevant elements of the method statements – assisting the Construction Site Manager with the overall review;
- Consulting and liaising with Third Parties, where required;
- Updating/amending designs where required;
- Ensuring the UWF Related Works is constructed according to the planning drawings and consent.

3.3.2.4. Environmental Clerk of Works

The Environmental Clerk of Works is appointed by the Promoter and is independent of the Appointed Contractor. The Environmental Clerk of Works reports directly to the Promoters Project Manager. The duties and responsibilities of the Environmental Clerk of Works are outlined in the subsections below.

3.3.2.4.1. General

- Manage a team of Environmental Managers and assigning duties and responsibilities in relation to the EMP to individual members
- Being familiar with the contents, environmental commitments and requirements contained within the Reference Documents outlined in Section 4 of this EMP;
- Provision of information on environmental management to the Design Engineer during the course of the construction phase;
- Liaising with the Project Promoter in relation to environmental issues;
- Monitoring construction activities and auditing compliance of construction works with the Environmental Commitments and Environmental Control Measure; and
- Monitoring the implementation of the Environmental Commitments;
- Preparing weekly EMP Compliance Reports.

3.3.2.4.2. Compliance Auditing

- Carrying out daily documented inspections and audits of the site and construction works to check that work is being carried out in accordance with the Environmental Commitments and Environmental Control Measures set out in Section 4 and Section 5 of this EMP.
- Carrying out daily inspections of the fuel/oil storage area and the site drainage system.

- Liaising with the Construction Site Manager to organise any repairs or maintenance required following the regular inspections of the site.
- Weekly reporting on the compliance of the construction works with the EMP
- Reporting on the environmental effects of the project against the predictions made during the EIA process;
- Reporting on the effectiveness of the environmental management of the project;
- Reporting on the adequacy of the Promoters and Contractors response to any Corrective Action Requests
- Appending copies of the inspection reports to the EMP.

3.3.2.4.3. Detailed Method Statements

- Liaising with the Construction Site Manager regarding Method Statements for all works activities where there is a risk of environmental damage to ensure that these method statements incorporate the relevant Environmental Control Measures.
- Liaising with the Construction Site Manager in reviewing and updating the Method Statements where Environmental Control Measures have been altered.

3.3.2.4.4. Third Party Consultations

- Overseeing, ensuring coordination and playing a lead role in third party consultations required statutorily, contractually and in order to fulfil best practice requirements;
- Ensuring that the minutes of meetings, action lists, formal communications, etc., are well documented;
- Liaising with all prescribed bodies during any site visits, inspections and consultations;
- Where new Environmental Control Measures are agreed as a result of third party consultation, ensuring that the EMP is amended accordingly and liaising with the Construction Site Manager to ensure that any relevant Method Statements are updated;

3.3.2.4.5. Licensing

- Confirming that all relevant works have (and are being carried out in accordance with) the required, planning consents, permits, licences etc.;
- Where relevant, liaising with the designated licence holders with respect to licences granted pursuant to the Wildlife Act, 1976, as amended;
- Bringing to the attention of the Project Team any timing and legal constraints that may be imposed on the carrying out of certain tasks.

3.3.2.4.6. Specialist environmental contractors

- Identifying requirements for specialist environmental contractors (for example ecologists, spill clean-up specialists etc.) before commencement of the project;
- Procuring the services of specialist environmental contractors when required and liaising with them with respect to site access and report production;
- Ensuring that the specialist environmental contractors are competent; and
- Co-ordinating the activities of all specialist environmental contractors.

3.3.2.4.7. Environmental Induction Training and Environmental Tool Box Talks

- Confirming that Environmental Induction Training is carried out for all site personnel. No personnel will be allowed to work on the site without proof of attendance at an Environmental Induction.
- Providing toolbox talks on Environmental Control Measures associated with Site-specific Method Statements to those who will undertake the work.

3.3.2.4.8. Environmental Incidents/Spillages

- Have the authority to temporarily stop works over part of the site to avoid an environmental offence being committed;
- Prepare and be in readiness to implement at all times environmental emergency response measures, see Section 6 of this EMP.
- Notifying the relevant statutory authority of environmental incidents, and
- Carrying out an investigation and producing a report regarding environmental incidents. The report of the incident and details of remedial actions taken will be made available to the relevant authority, the Promoter and the Project Team.

3.3.2.5. Other Roles

3.3.2.5.1. Project Supervisor Construction Stage - PSCS

The PSCS for the construction project is appointed by the Main Contractor in line with the Construction Regulations:

- carrying out duty of Project Supervisor Construction Stage
- responsible for safety induction of all staff and personnel on site
- implementing the Health and Safety Plan
- auditing and updating the Health & Safety Plan
- all other relevant legal Safety duties
- implement and record the Waste Management Plan
- Holding copies of all permits and licences provided by waste contractors;
- Ensuring that any operations or activities that require certificates of registration, waste collection permits, waste permits, waste licences, etc., have appropriate authorisation, and
- Gathering and holding documentation with the respect to waste disposal.

3.3.2.5.2. Community Liaison Officer

The Community Liaison Officer is responsible for communicating with the local community and wider public during the construction stage, including;

- Responding to any concerns or complaints raised by the public in relation to the construction of the UWF Related Works;
- Liaising with the Environmental Clerk of Works on local community concerns relating to the environment;
- Keeping the local community informed of project progress and any construction activities which may cause inconvenience to them.

3.3.2.5.3. Specialist Environmental Contractors

Project Ecologist

An ecologist will be appointed by the Environmental Clerk of Works and will be responsible for:

- Advising the Environmental Clerk of Works, Project Manager, Construction Manager and Project Promoter on relevant wildlife/environmental legislation and aid in the development of practical solutions
- carrying out the habitat and species surveys during the appropriate periods
- aiding with the implementation of biodiversity related planning conditions
- monitoring and aiding with the implementation of biodiversity related Project Design Environmental Measures
- monitoring the implementation of the biodiversity related Best Practice Measures
- monitoring the implementation of the Invasive Plant Species Management Plan
- monitoring vegetation clearance, tree root protection
- monitoring the success of the re-vegetation work

Project Aquatic Ecologist

- monitoring instream works at Class 1 and Class 2 watercourses,
- monitoring the reinstatement of these watercourses following works, and
- advising the Environmental Clerk of Works and the Construction Manager on techniques to be implemented.

Project Hydrologist

A hydrologist will be appointed by the Environmental Clerk of Works and will be responsible for:

- Monitor the implementation of the Surface Water Management Plan (SWMP);
- Carrying out of site inspections in accordance with the SWMP
- carrying out of water quality monitoring prior to, during and post construction

Project Archaeologist

An archaeologist will be appointed by the Environmental Clerk of Works and will be responsible for:

- monitoring of groundworks associated with the development,
- communicating with the National Monument Service regarding licences etc.

3.3.2.5.4. All site personnel

All site personnel are responsible for:

- Adhering to the relevant Environmental Control Measures and relevant site-specific Method Statements
- Reporting immediately, to the Construction Site Manager and the Environmental Clerk of Works, any incidents where there has been a breach of agreed procedures including any spillage of a potentially environmentally harmful substance; damage to a protected habitat, etc.

3.4. Environmental Awareness Training

Environmental Awareness Training will be provided to ensure that all of the appointed Contractors site personnel have the appropriate knowledge to successfully implement the EMP. The main objective of the training is to make sure that site personnel are aware of the relevant Environmental Commitments and Environmental Control Measures and that site personnel are aware of the steps to take in an environmental emergency situation.

3.4.1. EMP and Contractual Requirements Briefing

The Environmental Clerk of Works will regularly brief the relevant project team members on the compliance with the EMP and on the Environmental Commitments which must be met and the Environmental Control measures which must be implemented during the construction.

3.4.2. Environmental Induction Training

The Environmental Clerk of Works will provide Environmental Induction Training for all project team members. All other site personnel, including sub-contractor personnel, will receive relevant environmental induction training in conjunction with safety induction training.

Every member of the Main Contractors and sub-contractor's teams must have access to and have read the EMP prior to beginning works – this will be a strict requirement for all people working on this project. No workers will be allowed to work on this project without having attended a formal Environmental Induction. The induction training will ensure that both Contractors employees and subcontractors are fully informed of their responsibilities regarding specific environmental obligations. The induction will outline the objectives for the environmental management of the site, identify the relevant environmental sensitivities and outline the environmental control measures to be put in place to prevent significant adverse impacts to the environment.

Signed training records will be kept by the Environmental Clerk of Works for all environmental training provided.

3.4.3. Task Specific Training – Tool Box Talks

Where a site-specific Method Statement (one which incorporates Environmental Control Measures) has been devised for a works activity, all site personnel involved in that activity will receive a toolbox talk outlining the Environmental Control Measures. The Site Supervisor will be responsible for providing the toolbox talk and will provide signed training records to the Environmental Clerk of Works.

3.5. Communication

Procedures for both internal and external communication of information regarding specific elements of the UWF Related Works will be implemented during the construction of the development.

3.5.1. Internal Communication

During construction, the Environmental Clerk of Works will be responsible for communicating the Environmental Commitments, Environmental Control Measures and Emergency Contingency Measures to the Main Contractor, who will communicate them to the Site Supervisors, who in turn will bring the relevant Environmental Control Measures to the attention of all site personnel.

Important environmental information on specific elements of the UWF Related Works will be communicated to contractors and site personnel through site inductions, site management meetings, safety meetings and tool-box talks. The Environmental Clerk of Works will attend and report on environmental issues at the site management meetings.

3.5.2. External Communication with the Public

Communications with the public will managed by a Community Liaison Officer (CLO), appointed by the Promoter. A two-way mechanism will be put in place whereby members of the public will be able to communicate with the CLO and also the CLO will be able to communicate important information on various aspects of the development to the general public.

A complaints register will form part of the public communications strategy. Any complaints will be handled by the Community Liaison Officer with the complainant receiving a response within one week after lodging the complaint.

All environmental complaints will be directed to the Environmental Clerk of Works.

4. Environmental Commitments

The Environmental Commitments are the obligations and requirements which will be implemented during the development of the UWF Related Works to avoid, prevent or minimise significant adverse impacts to the environment.

The current List of Environmental Commitments, listed in Table 5 below, arises from the UWF Related Works EIA Report (January 2019). This List will be updated with any additional environmental commitments arising from the Reference Documents in Section 4.1 below.

Table 5: List of Environmental Commitments (ECs) – *to be updated*

Environmental Commitment	**Source**	**Implemented By:** **Construction Manager/ Env. Clerk of Works / Project Manager / Other**	**Method by which the EC will be met**
The Project Promoter is committed to implementing the **Project Design Measures** PD01 to PD43.	EIAR, Ch.5	Project Team and specialist environmental and engineering experts	Incorporation of PD's listed in Section 5 below into Method Statements, Management Plans, Scheduling of Works and Surveying Requirements.
The Project Promoter is committed to implementing the **Traffic Management Plan.**	EMP, Tab 3	Project Team	Traffic Management Plan
The Project Promoter is committed to implementing the **Surface Water Management Plan.**	EMP, Tab 4	Project Team Site Ecologist Site Hydrologist	Surface Water Management Plan
The Project Promoter is committed to implementing the **Invasive Species Management Plan.**	EMP, Tab 5	Project Team Site Ecologist	Invasive Species Management Plan
The Project Promoter is committed to implementing the **Waste Management Plan.**	EMP, Tab 6	Project Team	Waste Management Plan
The Project Promoter is committed to implementing **Best Practice Measures** GC-BPM-01 to GC-BPM-32.	EMP, Tab 7	Project Team Site Ecologist Site Hydrologist	GC-BPM-01 to GC-BPM-35, included in Section 5 below
The Project Promoter is committed to **monitoring** the development to check that the project is in practice, conforming to the predictions made in the EIA Report.	EIAR, Ch.5	Project Team and specialist environmental and engineering experts	EMP Compliance Record Sheets Environmental Surveying Requirements

4.1. Reference Documents

The List of Environmental Commitments will be updated with any relevant changes to the Reference Documents, listed in Table 6.

Table 6: List of Reference Documents

Reference Document Title	Location
Grant of Permission including Planning Conditions	Tab 1
Feedback from consultations with Statutory Bodies and Other Parties	Tab 2
UWF Related Works Environmental Impact Assessment Report (EIA Report)	See Volume C of the planning application
Outline Construction Methodologies	Tab 8
Construction Contract Documents	Tab 9

5. Environmental Protection Measures

The current Environmental Protection Measures comprise:

- Project Design Measures PD01 to PD43,
- Management Plans – Traffic, Surface Water Quality, Invasive Species and Waste,
- Schedule of Works Requirements,
- Environmental Survey Requirements, and
- Best Practice Measures RW-BPM-01 to RW-BPM-32.

The Environmental Protection Measures will be reviewed regularly by the Environmental Clerk of Works and kept up to date to reflect additional environmental conditions attached to planning conditions, conditions of licences, following third party feedback or any additions to the Environmental Commitments.

5.1. Mitigation Measures

Table 7: Schedule of Project Design Environmental Protection Measures (MITIGATION MEASURES)

PD ID	Schedule of Project Design Environmental Protection Measure (MITIGATION MEASURES)
PD01	All construction works will be carried out during daylight hours.
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.
PD03	Construction works 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 Grid Connection or Upperchurch Windfarm.
PD04	Confirmatory consultations with Irish Water, Eir and ESB and confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a foreman will look out for underground pipes during excavations near services.
PD05	Land reinstatement will not be carried out during very wet weather or when the soil is waterlogged.
PD06	If any compaction has occurred along the construction works area, these areas will be ploughed with a sub-soiler to loosen the subsoil layer
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
PD08	All initial groundworks will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works. Where excavations occur in areas of archaeological potential such as fording points and associated marsh lands and watercourses all excavated material will be spread out and metal detected (under licence to National Monuments Service) as part of the finds retrieval strategy.
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.
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
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.
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.
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.
PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.

PD ID	Schedule of Project Design Environmental Protection Measure (MITIGATION MEASURES)
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.
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.
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse
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.
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.
PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells
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).
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.
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.
PD25	All new permanent culverts on Class 1 and Class 2 type watercourses will be bottomless or clear spanning.
PD26	~~If works are programmed to begin in the Hen Harrier breeding season (March to August)~~ Confirmatory hen harrier breeding surveys will be completed, ~~before such works~~, 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 ~~within 500m of an active hen harrier breeding attempt or active nesting activity,~~ during the hen harrier breeding season (March to August).
PD27	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.
PD28	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~~, where possible~~. This includes hedgerow and scrub removal in addition to hedgerow trimming.
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.
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.
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
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.

PD ID	Schedule of Project Design Environmental Protection Measure (MITIGATION MEASURES)
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.
PD34	Confirmatory surveys will be carried out within 50 m of either side of the construction works area boundary of identified badger setts to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the intervening period following initial pre-planning surveys and the commencement of construction activity. These confirmatory badger surveys will be undertaken no more than 10-12 months in advance of proposed construction activities, during the period November and April when vegetation cover is reduced. NWPS will be notified immediately if the sett previously identified is confirmed as active or if a further active sett is located within 50 meters of the footprint of the development. If sett exclusion is required, this will be undertaken by an experienced ecologist under the necessary license and following best practice guidance (NRA, 2005).
PD35	No construction works will be carried within 50m of an active sett during the main breeding season (December 1st to June 30th).
PD36	Construction activity in the environs of a known active badger sett outside of the breeding period will follow NRA (2005) guidelines, i.e. no heavy machinery will be used within 30m of badger setts (unless carried out under license); lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances.
PD37	All construction works will be carried out during daylight hours. Security lighting will be used at the Consented Upperchurch Windfarm Site Compound No.1~~compounds~~. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.
PD38	Confirmatory surveys will be carried out at all trees with bat suitability that will require felling or other major modifications (e.g. removal of rotten branches). These trees will be subject to a ground-level visual inspection by the Project Ecologist (or a bat specialist acting on their behalf) prior to site clearance works in order to confirm the findings of the 2016 / 2017 surveys.
PD39	Where a tree with moderate or high bat suitability is to be felled, a presence/absence bat surveys will be carried out. (Note. It is not expected that any trees with moderate or high suitability will be felled).
PD40	Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November. Trees with low suitability for bats will be felled carefully and slowly in order to avoid impact-related injuries to any bats that may be roosting inside them. Sections of the tree with potential roost features for bats (e.g. crevices, damaged branches) will be cut in sections, lowered carefully to the ground and left undisturbed for 48 hours before removal. (Note. It is not expected that any trees with moderate or high suitability will be felled).
PD41	Where the felling of trees with bat suitability is carried out, robust, weather-proof bat-boxes, for example Schwegler type 1FF and 2F models, will be placed in each of the affected sections to compensate for the loss of potential tree roosts. The number of bat boxes will match the number of trees with bat suitability to be felled. Bat boxes will be placed on an exposed section of tree trunk at a minimum height of 4-5m, providing a clear space in front of the box for bats to enter and exit. Boxes will be placed in locations that will receive at least 6-7 hours of sunlight during summer months, and will typically be placed on the southern side of the tree. The Project Ecologist will supervise the installation of bat boxes in order to ensure that they are sited appropriately.
PD42	Installation of bat crossing structures at severed hedgerows, proximate to areas of high bat activity or roost locations. And following the completion of construction works, the replanting of these severed

PD ID	Schedule of Project Design Environmental Protection Measure (MITIGATION MEASURES)
	hedgerows with at least the same number of semi-mature ~~shrubs/trees (like for like)~~ Irish-sourced, native trees and ~~limits on~~ no temporary construction works area lighting near hedgerows.
PD43	Pre-construction survey of the distribution of Devil's-bit Scabious (larval food plant of Marsh Fritillary) during the last available April prior to the commencement of construction works. This requires that any areas of Devil's-bit Scabious that are located within the construction works area boundary, will be strimmed/cut to ground level in the last available late April / early May period prior to the commencement of construction.

5.2. Management Plans

The Management Plans are listed in Table 8 below, and included in full in **Tab 3 to 6** of this EMP.

Table 8: List of Environmental Protection Measures - Management Plans

Management Plan	Tab
Traffic Management Plan	3
Surface Water Quality Management Plan	4
Invasive Species Management Plan	5
Waste Management Plan	6

5.3. Schedule of Works Requirements

ENVIRONMENTAL PROTECTION MEASURE – SCHEDULING OF WORKS	
Title:	**Scheduling of Works**

Responsibility of	**Role/Duty**
Project Manager	Liaising with the Construction Manager, Environmental Clerk of Works and Site Ecologist regarding temporal restrictions

Scheduling of Works included as Project Design Environmental Protection Measures	
PD01	All construction works will be carried out during daylight hours.
PD03	Construction works 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 Grid Connection or Upperchurch Windfarm.
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.
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).
PD26	~~If works are programmed to begin in the Hen Harrier breeding season (March to August)~~ Confirmatory hen harrier breeding surveys will be completed, ~~before such works~~, 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 ~~within 500m of an active hen harrier breeding attempt or active nesting activity,~~ during the hen harrier breeding season (March to August).
PD27	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.
PD28	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~~, where possible~~. This includes hedgerow and scrub removal in addition to hedgerow trimming.
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.
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
PD35	No construction works will be carried within 50m of an active sett during the main breeding season (December 1st to June 30th).
PD40	Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November. Trees with low suitability for bats will be felled carefully and slowly in order to avoid impact-related injuries to any bats that may be roosting inside them. Sections of the tree with potential roost features for bats (e.g. crevices, damaged branches) will be cut in sections, lowered carefully to the ground and left undisturbed for 48 hours before removal. (Note. It is not expected that any trees with moderate or high suitability will be felled).

5.4. Environmental Survey Requirements

The surveys which will be carried out during the construction and operational stages of the UWF Related Works are listed in Table 9.

Table 9: Surveying included as part of Project Design Environmental Protection Measures and Best Practice Measures

Measure ID	Project Design Environmental Project Measure/Best Practice Measure Survey Description
PD08	All initial groundworks will be monitored by an archaeologist under license from the National Monuments Service, to archaeologically record and preserve, either in situ or by record, any structures, features or objects of archaeological significance which may be encountered during the works.
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.
PD34	Confirmatory surveys will be carried out within 50 m of either side of the construction works area boundary of identified badger setts to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the intervening period following initial pre-planning surveys and the commencement of construction activity. These confirmatory badger surveys will be undertaken no more than 10-12 months in advance of proposed construction activities, during the period November and April when vegetation cover is reduced. NWPS will be notified immediately if the sett previously identified is confirmed as active or if a further active sett is located within 50 meters of the footprint of the development. If sett exclusion is required, this will be undertaken by an experienced ecologist under the necessary license and following best practice guidance (NRA, 2005).
PD38 RW-BPM-14	Confirmatory surveys will be carried out at all trees with bat suitability that will require felling or other major modifications (e.g. removal of rotten branches). These trees will be subject to a ground-level visual inspection by the Project Ecologist (or a bat specialist acting on their behalf) prior to site clearance works in order to confirm the findings of the 2016 / 2017 surveys.
PD39 RW-BPM-14	Where a tree with moderate or high bat suitability is to be felled, a presence/absence bat surveys will be carried out. (Note. It is not expected that any trees with moderate or high suitability will be felled).
PD04	Confirmatory consultations with Irish Water, Eir and ESB and confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a foreman will look out for underground pipes during excavations near services.
PD43 RW-BPM-25	Pre-construction survey of the distribution of Devil's-bit Scabious (larval food plant of Marsh Fritillary) during the last available April prior to the commencement of construction works. This requires that any areas of Devil's-bit Scabious that are located within the construction works area boundary, will be strimmed/cut to ground level in the last available late April / early May period prior to the commencement of construction.
PD26 RW-BPM-12	~~If works are programmed to begin in the Hen Harrier breeding season (March to August)~~ Confirmatory hen harrier breeding surveys will be completed, ~~before such works~~, 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.

Measure ID	Project Design Environmental Project Measure/Best Practice Measure Survey Description
	No construction works for UWF Related Works will take place ~~within 500m of an active hen harrier breeding attempt or active nesting activity,~~ during the hen harrier breeding season (March to August).
PD27 RW-BPM-12	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-BPM-06	Surveying of drainage and ground conditions before and during tree felling activities. Water sampling at main watercourse downstream of felling post-felling.
RW-BPM-13	All known bat roosts within 150m of the construction works areas will be subject to confirmatory survey prior to the onset of construction works in order to identify any changes in the interim period since baseline establishment.
RW-BPM-15	Post-construction activity surveys will be carried out annually by the Project Ecologist, roost surveys on roosts identified as part of baseline evaluation will be carried out under Licence within the suitable survey season as per Best Practice. All hedgerow locations subject to Bat Crossing Structures and reinstatement measures will also be surveyed by a suitably qualified Bat expert within the suitable survey season as per Best Practice.
RW-BPM-16	Monitoring in the form of confirmatory surveys will be carried out by the Project Ecologist to accurately determine the current status of invasive species locations identified during baseline studies; and identify any other infestations close to the construction works areas or operational stage maintenance works areas.
RW-BPM-17	Where practical, vegetation clearance will be carried out outside of the restricted breeding bird period (1st March to 31st August). Where clearance is required within the closed season, a survey will be carried out by the Project Ecologist for the presence of active birds' nests (i.e. nests with eggs or young birds).
RW-BPM-19	Kingfisher: Surveys will be undertaken between March and April (early visit) and again between May and June (late visit) of the construction year and will be targeted at confirming breeding attempts and/or nest locations along rivers within 300m of works area boundary (No nests were located within 300m during baseline surveys). All crossing locations will be also be surveyed to confirm Kingfisher suitability both in terms of nest banks and suitable bankside vegetation at the time of construction. During Kingfisher surveys, all crossing locations will also be surveyed to confirm the presence or absence of other aquatic/riparian species such as Dipper, Grey Wagtail.
RW-BPM-20	Survey of identified badger setts within 50 m of either side of the construction works area boundary to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the period following the completion of construction. Surveys will be undertaken annually in Operational Years 1, 2, 3, 4 and 5.
RW-BPM-21	Red Squirrel/Pine Martin: Confirmatory surveys (of suitable habitat) for the presence/absence of these protected species or their breeding/resting places within 50m of the construction works area will be undertaken prior to the commencement of vegetation and/or hedgerow clearance and excavations. Confirmatory surveys to check for any new dens/dreys that may have arisen between the time of the original survey and start of works will be carried out by the Project Ecologist. On-going survey of any dreys within 50m of works areas to monitor the breeding status of the drey, (red squirrels can move dreys during the breeding season, so a non-breeding drey could change status).
RW-BPM-23	Common Frog/Smooth Newt: Should construction activities be scheduled for areas proximal to previously identified habitat suitable for breeding common frog or smooth newt during the species' respective breeding seasons (frogs: January-March and newts: March-May), confirmatory surveys following standardised methodologies will be carried out at those locations to confirm the presence/absence of breeding adults and/or spawn.
RW-BPM-24	As Viviparous lizards are widespread in Ireland and can be found in a range of habitat types such as in bog, heath, the margins of coniferous woodlands, in addition to being common in a range of grassland habitats, particularly those not subject to heavy grazing pressure, a spot-check confirmatory survey by

Measure ID	Project Design Environmental Project Measure/Best Practice Measure Survey Description
	the Project Ecologist will be required within these habitats prior to the commencement of the construction stage to confirm the presence/absence of individuals.
RW-BPM-30	Public Roads: Along construction materials haulage routes, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken along the routes of concentrated construction traffic between the R503 and the site entrances on the local road network. Whilst it is not expected to occur, any damage to structures or road pavements will be repaired to at least as good a condition as pre-works, and on damaged sections of roads where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250, full-width surface overlay will be carried out.
RW-BPM-31	EMF: A confirmatory survey of Electromagnetic Field emissions from locations along the Internal Windfarm Cabling will be carried out by a competent engineer. The locations along the Internal Windfarm Cabling will include the following 9 No. local road crossings in Knockmaroe/Knockcurraghbola Crownlands, Knockcurraghbola Commons and Foilnaman.
SWMP	Water Quality Monitoring: Daily visual checks; Weekly sampling for suspended solids and turbidity in catchments where tree felling, earthworks or watercourse crossing work is on-going and monthly monitoring for all other parameters; 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.

5.5. Best Practices Measures

The Best Practice Measures are listed in Table 9 below, and included in full in **Tab 7** of this EMP.

Table 10: List of Environmental Protection Measures - Best Practice Measures

BPM ID	Best Practice Measure
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-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion 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 along the Whole UWF Project areas
RW-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas
RW-BPM-12	Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)
RW-BPM-13	Minimising the effects of lighting on bats
RW-BPM-14	Protection of potential tree and bridge bat roosts
RW-BPM-15	Bats – Post Construction Monitoring
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-18	Best practice for the protection and preservation of tree roots during the construction phase

BPM ID	Best Practice Measure
RW-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).
RW-BPM-20	Monitoring of Identified Badger Setts
RW-BPM-21	Disturbance and/or physical injury to Other Mammals
RW-BPM-22	Management of general non-native invasive species
RW-BPM-23	Best practice methods to ensure the protection of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*).
RW-BPM-24	Best practice methods to ensure the protection of Viviparous lizard (*Lacerta (Zootoca) vivipara*)
RW-BPM-25	Measures to ensure the protection of Marsh Fritillary (*Euphydryas aurinia*)
RW-BPM-26	Local Employment and Local Sourcing
RW-BPM-27	Landowner and Land-user Liaison
RW-BPM-28	Minimising Disturbance and Damage to Land
RW-BPM-29	Minimising Dust Emissions From Site Activities
RW-BPM-30	Traffic Management Measures
RW-BPM-31	Measuring Operational EMF Emissions
RW-BPM-32	Measuring Operational Electricity Production

5.6. Application of Environmental Protection Measures

The Environmental Protection Measures do not always apply to all works areas. Table 10 below outlines which Environmental Protection Measures apply to each type of works location.

Table 11: Application of Environmental Protection Measures during the Construction Stage

	Relevant Project Design Environmental Protection Measure (PDs)	Relevant Management Plans	Relevant Best Practice Measures (BPMs)	Relevant Outline Construction Methodologies (OCMs)
Watercourse Crossing Locations (Class 1 and 2, fisheries value)	PD1, PD3, PD5, PD7, PD8, PD10, PD11, PD12, PD13, PD14, PD16, PD17, PD18, PD20, PD22, PD23, PD24, PD25, PD26, PD27, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-05, BPM-06, BPM-07, BPM-08, BPM-09, BPM-11, BPM-12, BPM-13, BPM-16, BPM-18, BPM-19, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-27, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01-, OCM-02, OCM-04, OCM-05, OCM-08, OCM-09, OCM-10, OCM-11
Watercourse Crossing Locations (Class 3 and 4 - sub-optimal or no fisheries value)	PD1, PD3, PD5, PD7, PD8, PD10, PD11, PD12, PD13, PD14, PD16, PD17, PD18, PD20, PD24, PD26, PD27, PD29, PD30, PD31, PD32, PD33, PD34, PD35	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-05, BPM-06, BPM-07, BPM-08, BPM-09, BPM-11, BPM-12, BPM-13, BPM-16, BPM-18, BPM-19, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-27, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01-, OCM-02, OCM-04, OCM-05, OCM-08, OCM-09, OCM-10, OCM-11
Public Roads	PD1, PD2, PD3, PD4, PD7, PD8, PD12, PD17, PD18, PD21, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD44	Surface Water Management Plan Traffic Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-09, BPM-11, BPM-12, BPM-16, BPM-21, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01-, OCM-02, OCM-03, OCM-06, OCM 08
Agricultural Lands	PD1, PD3, PD4, PD6, PD7, PD8, PD9, PD12, PD13, PD14, PD15, PD16, PD17, PD18, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD38, PD39, PD40, PD41, PD42, PD43, PD51, PD58, PD62, PD63, PD64	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-09, BPM-11, BPM-12, BPM-16, BPM-17, BPM-18, BPM-19, BPM-21, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-28, BPM-29, BPM-30, BPM-31, BPM-32, BPM-33, BPM-34	OCM-01, OCM-02, OCM-04, OCM-05, OCM-06, OCM-08, OCM-12, OCM-13, OCM-14, OCM-15,

	Relevant Project Design Environmental Protection Measure (PDs)	**Relevant Management Plans**	**Relevant Best Practice Measures (BPMs)**	**Relevant Outline Construction Methodologies (OCMs)**
Forestry Lands	PD1, PD6, PD7, PD8, PD9, PD12, PD13, PD14, PD15, PD16, PD17, PD18, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD38, PD39, PD40, PD41, PD62, PD63, PD64, PD65	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-09, BPM-10, BPM-11, BPM-12, BPM-16, BPM-17, BPM-18, BPM-19, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-28, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01, OCM-02, OCM-04, OCM-05, OCM-08, OCM-13, OCM-14, OCM-15, OCM-16,
Existing Private Roads / Consented UWF Roads	PD1, PD7, PD8, PD12, PD13, PD14, PD15, PD16, PD17, PD18, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD59, PD60, PD61, PD64, PD65	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-09, BPM-11, BPM-12, BPM-16, BPM-17, BPM-18, BPM-19, BPM-21, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-28, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01, OCM-02, OCM-08, OCM-12, OCM-13, OCM-15

6. Environmental emergency response measures

Environmental Emergency Procedure for Oil/Fuel Spillage

Work Sections/Locations	
All parts of the construction works area boundary	
Responsibility of	**Role/Duty**
Construction Manager	• Ensuring that all personnel are trained in emergency procedure for oil/fuel spillage • Ensuring that all construction site plant, machinery and vehicles are equipped with spill kits • Alerting the Environmental Clerk of Works of the oil/fuel spillage.

Incidents involving oil spillage

This procedure covers the accidental loss of oils that may arise from plant failures, fuelling, etc.,

- Ensure appropriately trained staff and necessary containment equipment is on site to allow immediate control of any spills.
- Contractors will be required to check all fuel and hydraulic lines, service, and document all machinery prior to the commencement of construction
- 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
- Spill response apparatus and infrastructure should be inspected on a regular basis to ensure that the kits are fully stocked and materials are of adequate condition, and where this is not the case kits should be replenished or replaced.
- Spill kits shall be fitted with break seals and site operatives shall be required to notify the construction manager if these seals are broken.
- Spill kits should be maintained at all fuelling and oil storage locations. All mobile fuelling and oil bowsers/tankers shall have full spill kits, appropriate to their capacity.
- All machines that utilise hydraulic systems, such as excavators, dumpers, and cranes, shall have appropriately sized spill kits on board at all times.
- It is the construction manager's responsibility to ensure spill kits/material is available as specified.

All hydrocarbons will be managed appropriately to prevent their potential release to surface or ground water.

- All hydrocarbon containers will be stored in bunds. For above ground tanks, double skinned tanks will be used and all will be externally bunded. All transfer of hydrocarbons will be undertaken in a bunded area.
- On arrival at spill site, assess the situation. If a volatile, flammable material is spilled, immediately warn everyone in the vicinity, control sources of ignition and ventilate the area.
- If possible without risk of personal injury, stop and contain the spillage using the appropriate spill kit (as per material type).
- Have all shores and surface water drains in area of spillage covered or protected as quickly as possible to prevent pollution.
- Report all spills immediately to the Environmental Clerk of Works and Construction Manager who will mobilize specially trained site personnel to clean up and dispose of residues and clean-up materials in an appropriate manner.
- Spill kit waste materials will be collected from the compound by a specialised hydrocarbon and hazardous waste service provider with a valid waste collection permit for reprocessing at a EPA waste licensed facility.

Environmental Emergency Procedure for significant pollution occurrence in local surface waters

Work Sections/Locations	
All parts of the construction works area boundary	
Responsibility of	**Role/Duty**
Construction Manager	• Will inform the Environmental Clerk of Works of any observed issues.
Environmental Clerk of Works	• Will notify an appropriate person in Tipperary County Council.

Incidents involving oil spillage

In the unlikely event of a significant pollution occurrence in local surface waters relating to the works then the following protocol will be adopted:

- Water quality monitoring will be undertaken visually, and the Construction Manager will have informed the Environmental Clerk of Works of any observed issues
- If the source is from the works then the Environmental Clerk of Works will notify an appropriate person in Tipperary County Council
- Work will not continue again until the source of the pollution is identified and eliminated

7. Monitoring

Adverse effects on the environment due to the development of the UWF Related Works mostly relate to the construction stage. Monitoring of the construction works will check that the project in practice conforms to the predictions made in the EIA Report during the planning process. This audit of the conformity with the EIA Report will be carried out through the EMP by the Environmental Clerk of Works.

7.1.1. Environmental Clerk of Works

The Project Promoter of the UWF Related Works (the 'Promoter') will employ a suitably qualified Environmental Clerk of Works (minimum NEBOSH Certificate in environmental management) who will be independent of the Main Contractor. The Environmental Clerk of Works will be employed for the duration of the pre-construction, construction and early operational stages (c.6 months), and will have a full time presence during the construction stage. The Environmental Clerk of Works will be adequately resourced and will manage a team of Environmental Managers, adequately staffed to ensure strict compliance with the EMP and all relevant planning conditions.

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.

7.1.2. Compliance Auditing

On-going audits, will be carried out by the Environmental Clerk of Works, during the construction of the UWF Related Works. The audits will record the:

- compliance with this EMP;
- environmental effects of the project against the predictions made during the EIA process;
- effectiveness of the environmental management of the project; and
- adequacy of the Promoters and Contractors response to any Corrective Action Requests.

7.1.3. Reporting

An EMP Compliance Report will be prepared weekly during the construction stage, issued to the PSCS for distribution and will be presented at all project EHS meetings to ensure that 'live' issues are dealt with in a time efficient manner.

The EMP Compliance Report will detail the findings and recommendations of the preceding monitoring and auditing activities and will include a detailed response from the Contractor to any of the recommendations contained in the previous report.

Template reporting and record sheets are included in Section 8 of this EMP for:

- Non-Compliance Report
- Register of Non-Compliance Reports Issued
- Environmental Training Record
- Register of Environmental Training Environmental Incident Record

- Environmental Incident Record
- Register of Environmental Incidents
- Environmental Public Complaint Record
- Register of Environmental Public Complaints

7.1.4. Corrective Actions

Where non-compliance is detected, a system of follow up and corrective action will be implemented. Corrective Action Requests (CARs) will be issued to the Contractor to ensure that prompt action is agreed and committed to, with a view to the effective resolution of any deviations from the EMP requirements.

CARs may be raised as a result of:

- A compliance audit; or
- A suggestion for improvement by a Statutory Body; or
- An incident or potential incident; or
- An internal or external communication.

All Corrective Action Requests will be numbered and logged.

8. Records & Reporting

8.1. Non-Compliance Record Sheet

Non-Compliance Record Sheet		
Date	Time	Logged By
Contractor or Subcontractor Details: Contractor Name: Contact Name: Telephone:		
Nature of Non-Compliance (specify Environmental Protection Measure breached)		
Time Specified for becoming compliant:		
Contractor or Subcontractor's confirmation of receipt of NCR Yes ☐ No ☐ Contractors or Subcontractors signature: _____ Date of Signing: _____		

8.2. Register of Non-Compliance issued

Register of Environmental Training											
Date Issued	Time	NCR Report No.	Contractor Name	Contact Name	Contact Telephone	Nature of Non-Compliance (Specify Procedure(s) contravened)	Time specified for becoming compliant	Contractor's Conformation of receipt of NCR (Y/N)	Date of Contractor's Conformation of receipt of NCR	Compliant within time given (Y/N)	If yes ---------- Nature of corrective / preventative action

8.3. Environmental Training Record Sheet

Environmental Training Record Sheet		
Training Title:		
Description		
External Trainers ☐	Name of Company:	
Internal Instruction ☐	Name and Signature of Trainer:	
Date:		
Duration of Training:		

Name	**Job Title**	**Signature (Employee receiving training)**

8.4. Register of Environmental Training

Register of Environmental Training								
Date	Training Title	Training Description	External Trainers (Y/N)	Name of Training Company	Name of Trainer	Duration	Name of Trainee	Job Title of Trainee

8.5. Environmental Incident Record Sheet

Environmental Incident Record Sheet		
Date	Time	Logged By
How was Incident Detected?		
Nature of Incident (e.g. Water pollution/Dust/Noise/Fuel Spill)		
Investigation Findings		
Corrective/Preventative Action Taken/Contingency Measures Employed		
Follow up reporting: EPA Letter ☐ Phone ☐ Date:_____ Tipperary County Council Letter ☐ Phone ☐ Date:_____ Office of Public Works Letter ☐ Phone ☐ Date:_____ Inland Fisheries Ireland Letter ☐ Phone ☐ Date:_____		
Signed: _____		

8.6. Register of Environmental Incidents

Register of Environmental Incidents								
Date	Time	How was Incident detected	Nature of Incident	Nature of Complaint	Investigation findings	Corrective / preventative action	Follow up Reporting	Incident logged by

8.7. Environmental Complaint Record Sheet

Environmental Complaint Record Sheet		
Date	Time	Logged By
Complainants Details *(if known)* Name: _____ Address: _____ Telephone Number: _____ Mode of Complaint: _____ (e.g. telephone/letter/verbal/via statutory body)		
Nature of Complaint (e.g. Water pollution/Dust/Noise/Fuel Spill)		
Response to Complaint *(including investigation findings, corrective actions/preventative action taken if required)*		
Corrective/Preventative Action Taken/Contingency Measures Employed		
Follow up correspondence: To complainant/_____: Letter ☐ Phone ☐ Date:_____ Further correspondence from complainant: Letter ☐ Phone ☐ Date:_____		
Signed: _____		

8.8. Register of Environmental Complaints

Register of Environmental Complaints								
Date	Time	Complainant's Details	Mode of complaint	Nature of Complaint	Responder to Complaint	Follow up correspondence	Complaint logged by	Date

8.9. Control of Spread of Alien Species Record Sheet

Contractor/Employee Name:		
Contractor Equipment List: (list all main equipment cleaned)		
Construction Location: (tick as appropriate)	• • (Specify exact location)	☐ ☐
Cleaning Location (specify location where cleaning took place, e.g. name of garage)		
Method of Cleaning (Specify nature of cleaning e.g. High-pressure steam, manual removal of vegetation, high pressure power hose, disinfection etc.)		
Date of Cleaning:		
Contractor Declaration: I hereby declare that all equipment used at the construction location indicated above has been thoroughly cleaned in accordance with the cleaning methodology set out above before entering the construction site. The machine I am using has not left site and re-entered since it was cleaned. Signed: _____ Date:		

9. Mapping & Figures

The following mapping and figures are included:

Figure No.	Figure Title
Figure RW EMP 1	Location of UWF Related Works on OSI Discovery Mapping
Figure RW EMP 2	Layout of UWF Related Works on Aerial Photography Mapping
Figure RW EMP 3	Layout of UWF Related Works, including Construction Works Areas and work Section Numbers on Aerial Photography Mapping
Figure RW EMP 4	Location of the UWF Related Works and the Other Elements of the Whole UWF Project on OSI Mapping
Figure RW EMP 5	UWF Related Works and the Other Elements of the Whole UWF Project in the vicinity of Upperchurch Windfarm
Figure RW EMP 6	UWF Related Works and the Other Elements of the Whole UWF Project in Knocknabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands.

The Construction Works Area Boundary and works Section numbers are identified on Figure RW EMP 3. Table 11 outlines the classification of each works Section. The classifications are:

- Watercourse Crossing Locations (Class 1 and 2, fisheries value)
- Watercourse Crossing Locations (Class 3 and 4, sub-optimal or no fisheries value)
- Public Roads
- Agricultural Lands
- Forestry Lands
- Existing Private Roads / Consented UWF Roads

Classification	Section Identification Codes
Agricultural Land Forestry Lands Existing Private Roads / Consented UWF Roads	SW1 - Section 1 to 84 RWR1 – Realigned Windfarm Roads 1 to 3 HW1 – Haul Route Works Locations 5 & 11
Watercourse Crossing Locations (Class 1 and 2, fisheries value) Watercourse Crossing Locations (Class 3 and 4, sub-optimal or no fisheries value	WW1 - Watercrossings 1 to 32
Public Roads	RW1 - Public Road Crossings/Works 1 to 9 HW1 – Haul Route Works Locations 1 to 13

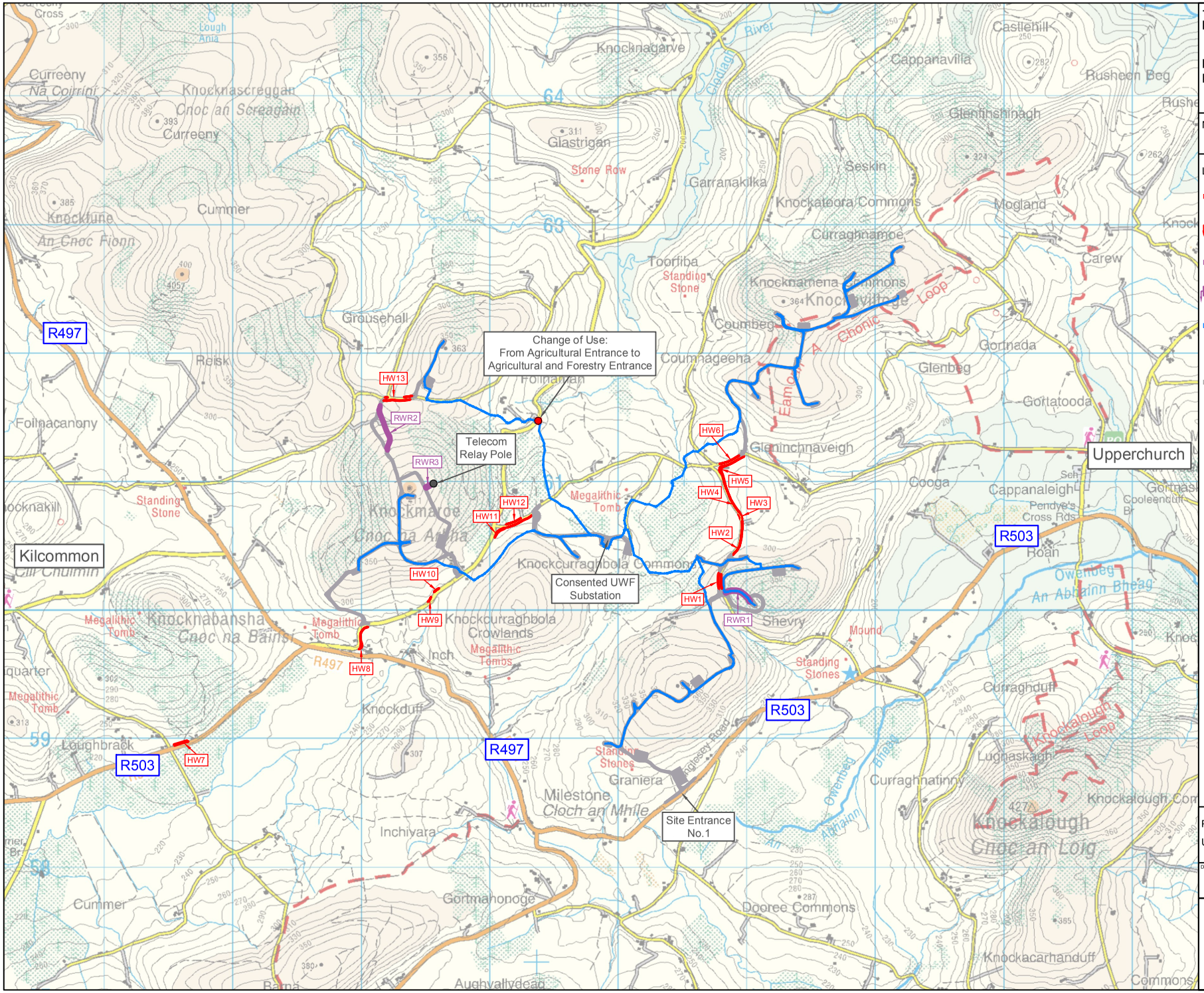
Table 12: Classification of Construction Works Sections

Section	Classifications
SW1	Existing Private Roads / Consented UWF Roads
SW2	Existing Private Roads / Consented UWF Roads
SW3	Existing Private Roads / Consented UWF Roads
SW4	Existing Private Roads / Consented UWF Roads
SW5	Existing Private Roads / Consented UWF Roads
SW6	Existing Private Roads / Consented UWF Roads
SW7	Existing Private Roads / Consented UWF Roads
SW8	Existing Private Roads / Consented UWF Roads
SW9	Existing Private Roads / Consented UWF Roads
SW10	Existing Private Roads / Consented UWF Roads
SW11	Existing Private Roads / Consented UWF Roads
WW1	Watercourse Crossing Class 3 + 4
SW12	Existing Private Roads / Consented UWF Roads
WW2	Watercourse crossings Class 1 + 2
SW13	Existing Private Roads / Consented UWF Roads
SW14	Agricultural Land
SW15	Agricultural Land
WW3	Watercourse Crossing Class 3 + 4
SW16 / RWR1	Forestry Land
SW17	Existing Private Roads / Consented UWF Roads
SW18	Existing Private Roads / Consented UWF Roads
SW19	Existing Private Roads / Consented UWF Roads
SW20	Agricultural Land
WW10	Watercourse Crossing Class 3 + 4
SW21	Agricultural Land
WW11	Watercourse Crossing Class 3 + 4
SW22	Existing Private Roads / Consented UWF Roads
RW1	Public Road
HW1	Public Road
HW2	Public Road
WW12	Watercourse Crossing Class 3 + 4
HW3	Public Road
HW4	Public Road
WW13	Watercourse Crossing Class 3 + 4
WW14	Watercourse Crossing Class 3 + 4
HW5	Existing Private Roads / Consented UWF Roads
HW6	Public Road
SW23	Existing Private Roads / Consented UWF Roads
SW24	Forestry Land
WW4	Watercourse crossings Class 1 + 2
WW5	Watercourse Crossing Class 3 + 4
SW25	Existing Private Roads / Consented UWF Roads
WW6	Watercourse Crossing Class 3 + 4
SW26	Agricultural Land

Section	Classifications
WW7	Watercourse crossings Class 1 + 2
SW27	Agricultural Land
WW8	Watercourse Crossing Class 3 + 4
WW9	Watercourse Crossing Class 3 + 4
SW28	Agricultural Land
RW5	Public Road
SW29	Agricultural Land
SW30	Agricultural Land
SW31	Agricultural Land
SW32	Existing Private Roads / Consented UWF Roads
SW33	Existing Private Roads / Consented UWF Roads
SW34	Existing Private Roads / Consented UWF Roads
SW35	Existing Private Roads / Consented UWF Roads
SW36	Existing Private Roads / Consented UWF Roads
SW37	Existing Private Roads / Consented UWF Roads
SW38	Existing Private Roads / Consented UWF Roads
SW39	Existing Private Roads / Consented UWF Roads
SW40	Existing Private Roads / Consented UWF Roads
SW41	Existing Private Roads / Consented UWF Roads
SW42	Existing Private Roads / Consented UWF Roads
SW43	Existing Private Roads / Consented UWF Roads
SW44	Existing Private Roads / Consented UWF Roads
WW15	Watercourse Crossing Class 3 + 4
SW45	Existing Private Roads / Consented UWF Roads
SW46	Existing Private Roads / Consented UWF Roads
SW47	Existing Private Roads / Consented UWF Roads
SW48	Existing Private Roads / Consented UWF Roads
SW49	Existing Private Roads / Consented UWF Roads
SW50	Existing Private Roads / Consented UWF Roads
WW16	Watercourse Crossing Class 3 + 4
SW51	Agricultural Land
WW17	Watercourse Crossing Class 3 + 4
RW2	Public Road
SW52	Agricultural Land
RW3	Public Road
WW18	Watercourse Crossing Class 3 + 4
SW53	Agricultural Land
SW54	Agricultural Land
WW19	Watercourse crossings Class 1 + 2
SW55	Forestry Land
SW56	Agricultural Land
SW57	Agricultural Land
WW20	Watercourse Crossing Class 3 + 4
RW4	Public Road
WW24	Watercourse Crossing Class 3 + 4

Section	Classifications
RWR2	Agricultural Land
WW25	Watercourse Crossing Class 3 + 4
WW32	Watercourse Crossing Class 3 + 4
HW13	Public Road
SW58	Existing Private Roads / Consented UWF Roads
SW59	Existing Private Roads / Consented UWF Roads
SW60	Existing Private Roads / Consented UWF Roads
RW7	Public Road
SW61	Agricultural Land
WW26	Watercourse Crossing Class 3 + 4
SW62	Agricultural Land
SW63	Agricultural Land
SW64	Agricultural Land
WW27	Watercourse Crossing Class 3 + 4
SW65	Existing Private Roads / Consented UWF Roads
SW66	Agricultural Land
RW8	Public Road
SW67	Agricultural Land
WW28	Watercourse crossings Class 1 + 2
SW68	Agricultural Land
SW69	Agricultural Land
RW9	Public Road
SW70	Agricultural Land
WW29	Watercourse Crossing Class 3 + 4
WW30	Watercourse Crossing Class 3 + 4
SW71	Agricultural Land
HW7	Existing Private Roads / Consented UWF Roads
HW8	Public Road
HW9	Public Road
HW10	Public Road
SW72	Existing Private Roads / Consented UWF Roads
SW73	Existing Private Roads / Consented UWF Roads
SW74	Existing Private Roads / Consented UWF Roads
RWR3	Agricultural Land
SW75	Existing Private Roads / Consented UWF Roads
SW76	Existing Private Roads / Consented UWF Roads
SW77	Existing Private Roads / Consented UWF Roads
WW23	Watercourse Crossing Class 3 + 4
RW6	Public Road
HW11	Agricultural Land
WW22	Watercourse crossings Class 1 + 2
HW12	Public Road
WW31	Watercourse Crossing Class 3 + 4
SW78	Agricultural Land
SW79	Agricultural Land

Section	Classifications
SW80	Agricultural Land
SW81	Agricultural Land
SW82	Existing Private Roads / Consented UWF Roads
WW21	Watercourse Crossing Class 3 + 4
SW83	Existing Private Roads / Consented UWF Roads
SW84	Existing Private Roads / Consented UWF Roads



Title:
Figure RW EMP 1

Location of UWF Related Works on OSI Discovery Mapping

Map Number:
Map 1 of 1

Legend:

- Haul Route Works
- HW1 — Haul Route Works Numbers (HW1 - HW13)
- Realigned Windfarm Road
- RWR1 — Realigned Windfarm Road Numbers (RWR1 - RWR3)
- Internal Windfarm Cabling
- Telecom Relay Pole
- Upperchurch Windfarm (UWF)
- R503 — Regional Road Number

Project:
UWF Related Works (RW)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	January 19	A4

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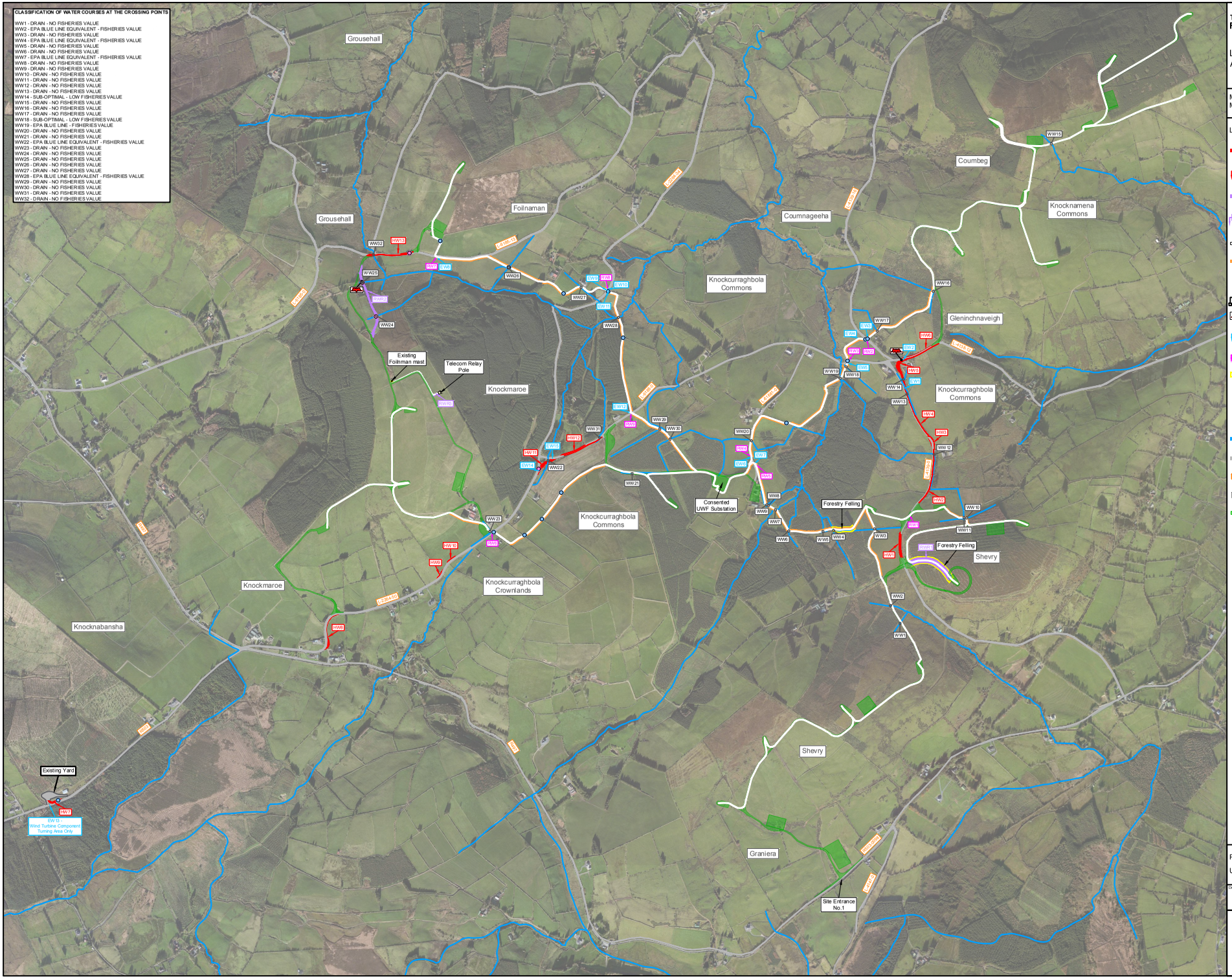

Title:
Figure RW EMP 2

Layout of UWF Related Works on Aerial Photography Mapping

Map Number:
Map 1 of 1

Legend:

- Haul Route Works
- Haul Route Works Numbers (HW1 - HW13)
- Realigned Windfarm Road
- Realigned Windfarm Road Numbers (RWR1 - RWR3)
- Internal Windfarm Cabling
- Temporary Access Roads
- Telecom Relay Pole
- Water Crossings
- Bat Crossing Locations
- Site Entrance
- Road Crossing (RW1 - RW9)
- Forestry Felling
- Temporary hedge/tree removal & pruning
- Permanent hedge/tree removal
- Watercourse
- Public Road
- Public Road Number
- Townlands
- Upperchurch Windfarm (UWF)

Project:
UWF Related Works (RW)

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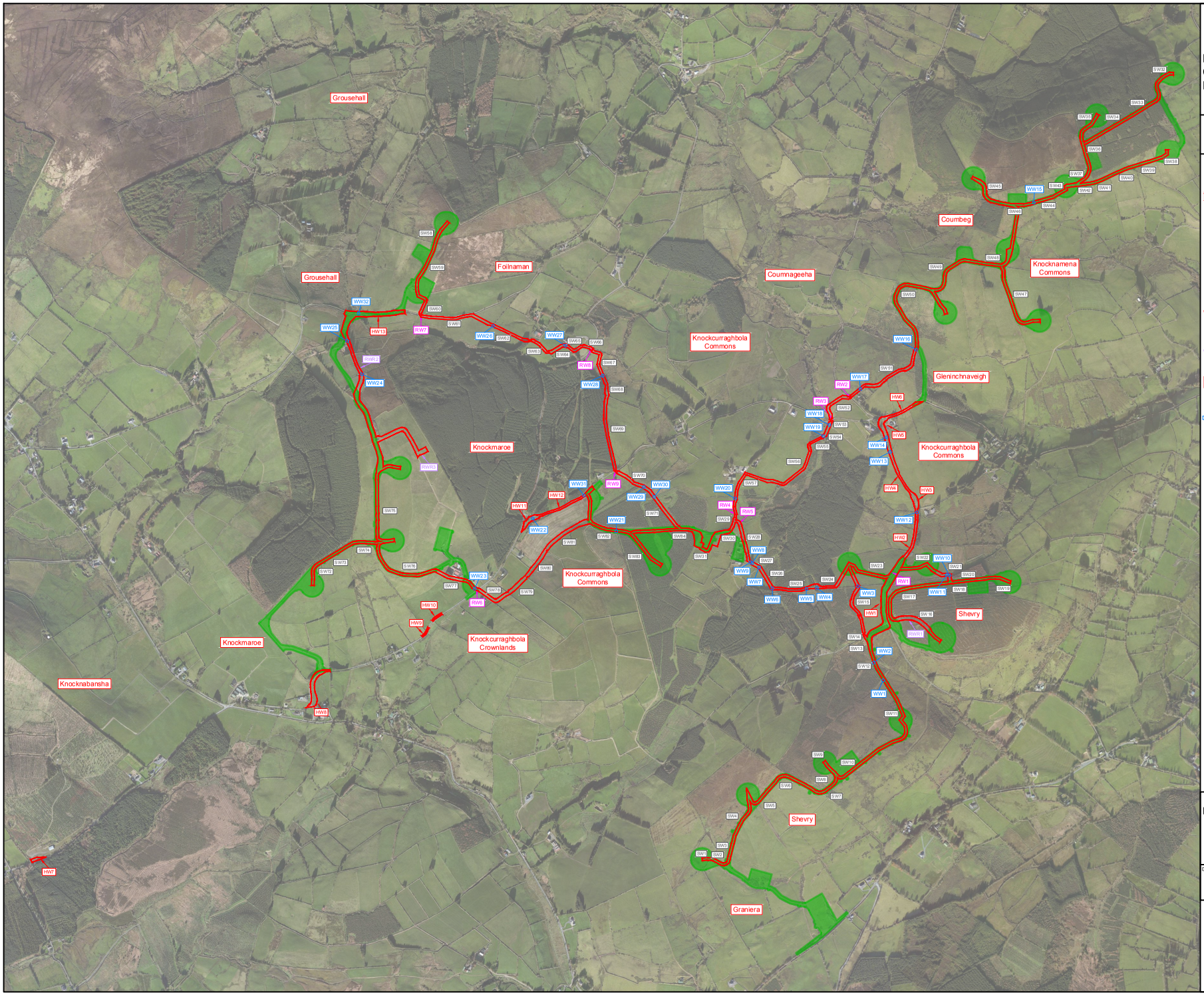

Title:
Figure RW EMP 3

Layout of the UWF Related Works, including Construction Works Areas and work Section Numbers on Aerial Photography Mapping

Map Number:
Map 1 of 1

Legend:

- Construction Works Area
- Upperchurch Windfarm (Land requirement during construction phase)
- SW3 — Section numbers (SW1 - SW84)
- HW2 — Section numbers for Haul Route Works (HW1 - HW13)
- RWR1 — Section numbers for Realigned Windfarm Roads
- Shevry — Townlands
- WW16 — Water Crossings
- RW2 — Road Crossings

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Project:
UWF Related Works (RW)

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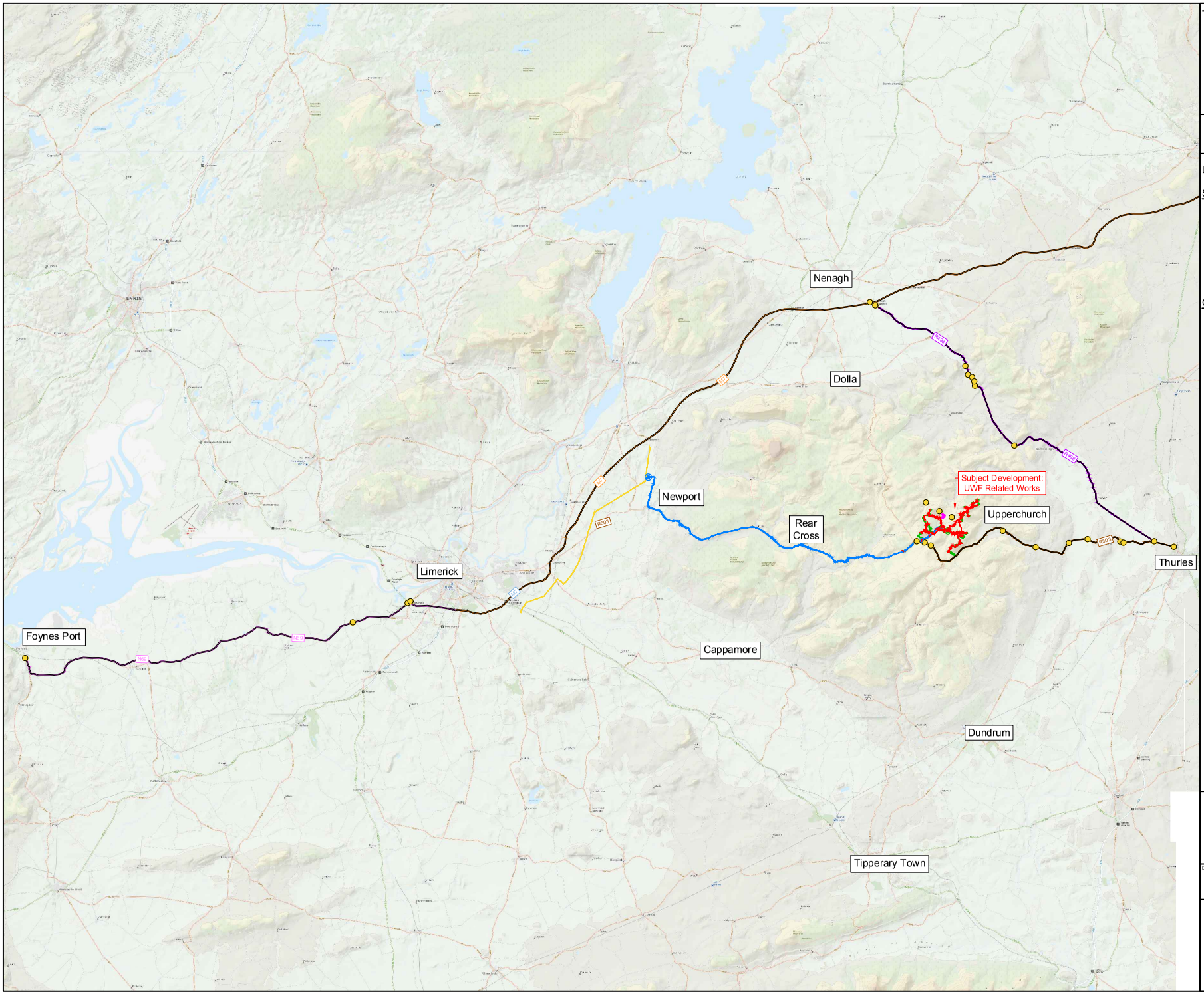

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Figure RW EMP 4

Location of the UWF Related Works and the Other Elements of the Whole UWF Project on OSI Mapping

Map Number:
Map 1 of 1

Legend:

Subject Development:

- UWF Related Works
  - Haul Route Works
  - Realigned Windfarm Road
  - Internal Windfarm Cabling
  - Telecom Relay Pole

Other Elements of the Whole UWF Project:

- UWF Grid Connection
- Mountphilips Substation
- Upperchurch Windfarm
- UWF Replacement Forestry
- UWF Other Activites

Project:

UWF Related Works (RW)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	January 19	A4

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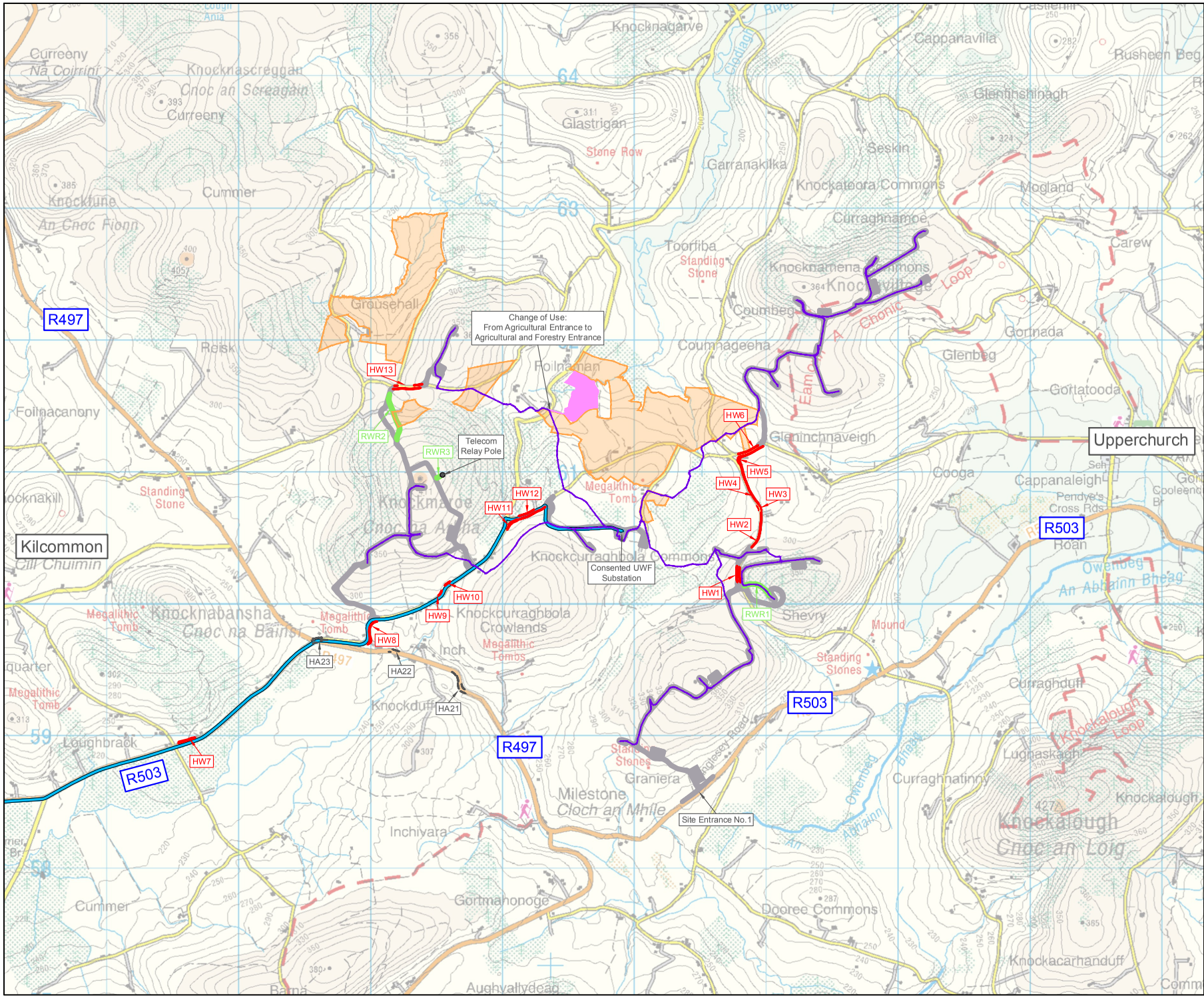

Title:
Figure RW EMP 5

UWF Related Works and the Other Elements of the Whole UWF Project in the vicinity of Upperchurch Windfarm

Map Number:
Map Overview on OSI Mapping

Legend:

UWF Related Works: (Subject Development)
- Haul Route Works
- HW1 Haul Route Works Numbers (HW1 - HW13)
- Realigned Windfarm Road
- RWR1 Realigned Windfarm Road Numbers (RWR1 - RWR3)
- Internal Windfarm Cabling
- Telecom Relay Pole

UWF Grid Connection:
- UWF Grid Connection

UWF Replacement Forestry:
- UWF Replacement Forestry

Upperchurch Windfarm:
- Upperchurch Windfarm
  -Consented UWF Turbines
  -Consented UWF Substation
  -Consented UWF Roads

UWF Other Activities:
- Haul Route Activities
- HA22 Haul Route Activities Number
- Upperchurch Hen Harrier Scheme

R503 Regional Road Number

N

Project:
UWF Related Works (RW)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	January 19	A4

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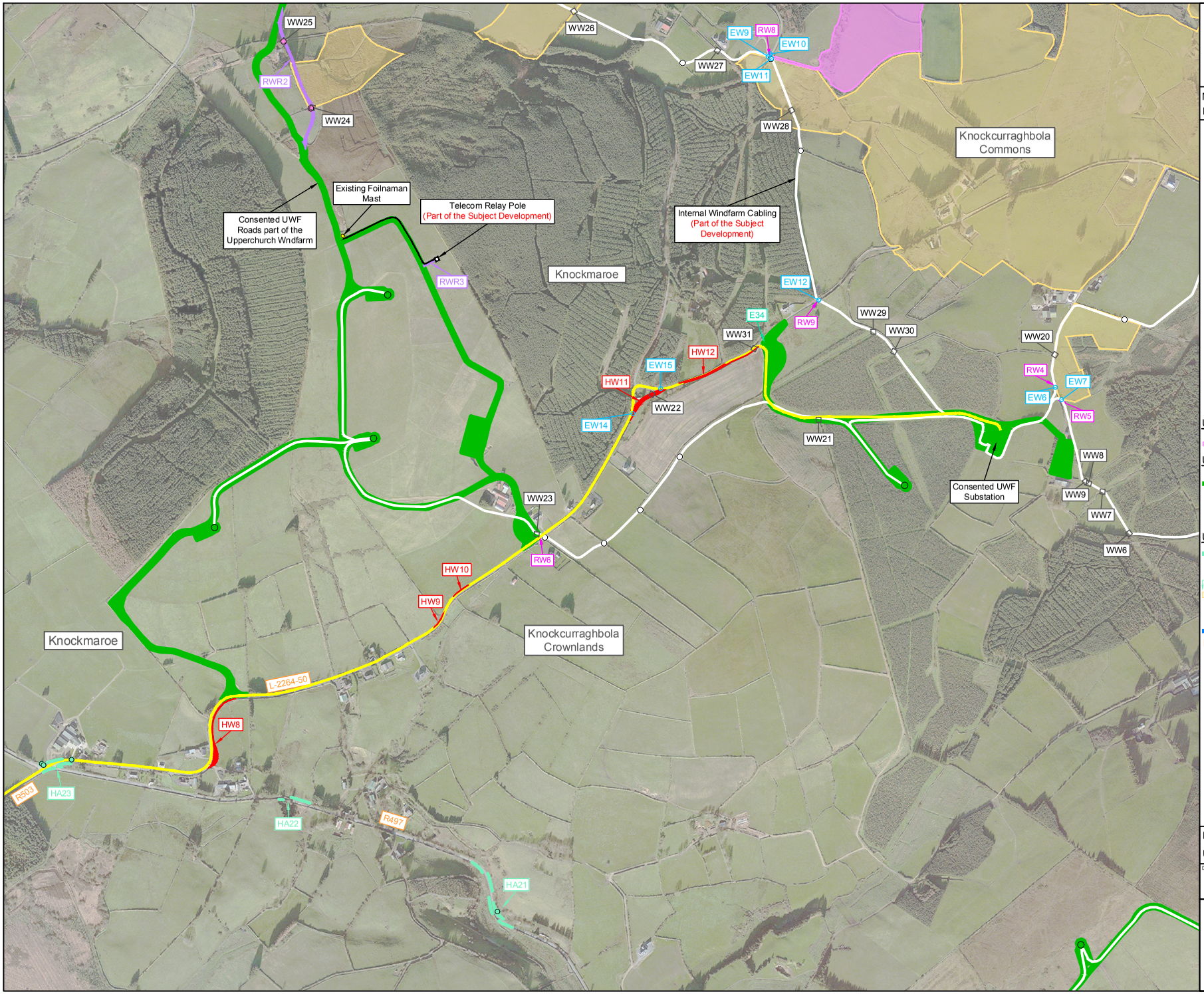

Title:

Figure RW EMP 6

UWF Related Works and the Other Elements of the Whole UWF Project in Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands

Map Number:

Map Overview on OSI Mapping

Legend:

UWF Related Works: (Subject Development)

- Haul Route Works
- Haul Route Works Numbers (HW8 - HW12)
- Realigned Windfarm Road
- Realigned Windfarm Road Numbers (RWR2 - RWR3)
- Internal Windfarm Cabling
- Telecom Relay Pole
- Temporary hedge/tree removal & pruning
- Permanent hedge/tree removal & pruning
- Related Works Water Crossings
- Bat Crossing Location
- Related Works Road Crossings
- Related Works Site Entrance

UWF Grid Connection:

- UWF Grid Connection

UWF Replacement Forestry:

- UWF Replacement Forestry

Upperchurch Windfarm:

- Upperchurch Windfarm
  - -Consented UWF Turbines
  - -Consented UWF Substation
  - -Consented UWF Roads

UWF Other Activities:

- Haul Route Activity - Vegetation Trimming
- Haul Route Activity - Street Furniture Removal
- Haul Route Activities Number
- Upperchurch Hen Harrier Scheme

- Watercourse
- Regional Road Number

N

Project:

UWF Related Works (RW)

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UWF RELATED WORKS

VOLUME D
REVISED ENVIRONMENTAL MANAGEMENT PLAN

Tab 1
Grant of Permission
including Planning Conditions

(post planning consent)

ECOPOWER

January 2019

UWF RELATED WORKS

VOLUME D
REVISED ENVIRONMENTAL MANAGEMENT PLAN

Tab 2
Feedback (post planning consent) from consultations with Statutory Bodies and Other Parties

ECOPOWER

January 2019

UWF RELATED WORKS

Tab 3
Traffic Management Plan

ECOPOWER

Revised EMP January 2019

Table of Contents

LIST OF FIGURES– contained in EIAR Volume C3: EIS Figures (and reproduced in this Plan)

Note: The numbering system for Figures follows the sequence 'Chapter Number-Figure Number'.

LIST OF TABLES

1 Traffic Management Plan (public roads)

1.1 Introduction

This Traffic Management Plan (TMP) for the public roads will be a key construction contract document, the implementation of which will reduce possible impacts to Public Roads and to Road Users which may occur due to the presence of construction traffic, in particular on the Local Roads in the vicinity.

1.1.1 Objective of the Traffic Management Plan

The objective of this preliminary TMP is to control and minimise the traffic impacts of construction insofar as it may affect the road network, local residents and the travelling public on the public roads close to and adjacent to the construction site, through measures to maximise road safety while keeping traffic flowing as freely as possible.

1.1.2 Scope of TMP

This TMP **concentrates on the construction stage** of the UWF Related Works which is the critical phase in the context of safe and effective traffic management on the public roads and describes the traffic management for the transportation of construction materials and personnel along the public road network.

This TMP details the traffic management measures to be undertaken on the public roads;

- at and on approach to road works locations;
- along local roads on the routes of concentrated construction traffic;
- on the R503, at and on approach to, the junction of the local roads (routes of concentrated construction traffic) with the R503
- at any points along public roads where UWF Other Activities are been carried out.

Control measures for traffic management at off-road construction works locations are outside the scope of this TMP and will be included in the Risk Assessment and Method Statements (RAMS) for the construction stage, which will be developed by the PSCS for the Appointed Contractor prior to the commencement of construction works.

The operational stage of the UWF Related Works is also outside the scope of this TMP. In contrast to the construction stage, negligible traffic is associated with the operational stage of the UWF Related Works and would only involve, for example, very occasional maintenance or repair work to widened road sections or repairs to an internal windfarm cable. This would require the delivery of an excavator and/or new cables and a cable pulling machine to some joint bay locations.

1.1.3 Responsibilities

This TMP will be updated from time to time to include any relevant planning conditions in addition to any new information on 3rd party road works or events, which could affect the timing, route or control measures for construction material deliveries.

The Appointed Contractor will be responsible for carrying out and managing the construction activities in accordance with the TMP.

The Environmental Clerk of Works will be responsible for monitoring the compliance with the TMP throughout the construction stage, through weekly auditing and point of interest inspections.

The Community Liaison Officer will be responsible for communicating with the local community and wider public during the construction stage, including keeping the local community informed of project progress and any construction activities which may cause inconvenience to them. Contact will be maintained with local residents on the day-to-day timing of, and traffic arrangements around, road works.

1.2 Overview of UWF Related Works

UWF Related Works, comprises the following elements:

- Internal Windfarm Cabling
- Realigned Windfarm Roads
- Haul Route Roads
- Telecom Relay Pole
- RW Ancillary Works

See Figure RW TMP 1. Location of the Related Works on OSI Discovery Mapping, which is included at the end of this plan.

1.2.1 Purpose of the UWF Related Works

The purpose of the Related Works are as follows:

- Internal Windfarm Cabling: to connect the Consented UWF Turbines to the Consented UWF Substation.
- Realigned Windfarm Roads: to realign two lengths of Consented UWF Roads and to provide access to a new telecom relay pole.
- Haul Route Works: to facilitate the haulage of turbine components to the Upperchurch Windfarm site.
- Telecom Relay Pole: to be erected in order to carry telecoms relay equipment, which will mitigate communication links impacts from operational Consented UWF Turbines on the communication signals between Foilnaman Mast and Laghtseefin Mast. The Telecom Relay Pole will fulfil Condition No. 18 of the planning conditions associated with the Upperchurch Windfarm.
- RW Ancillary Works: will facilitate the construction of the UWF Related Works.

Note: the Consented UWF Turbines, Consented UWF Roads and the Consented UWF Substation refer to components of Upperchurch Windfarm (UWF). UWF has already received planning consent, but is not yet constructed.

1.2.2 Description of the Characteristics of the UWF Related Works

The characteristics of UWF Related Works are described in more detail in the EIA Report, which accompanies the 2018 planning application to Tipperary County Council for the UWF Related Works, see Chapter 5: Description of the Development (UWF Related Works), in Volume C2 Main EIA Report.
The construction stage, is described at Section 5.3.1, construction materials which will be brought onto the site are described at Section 5.3.1.8 of Chapter 5: Description of the Development (UWF Related Works).

1.3 Overview of the Construction Stage of the UWF Related Works

1.3.1 Construction Process

The construction process for the UWF Related Works, is a relatively straightforward civil build. A number of separate dedicated 'crews' will work from the main consented UWF Site Compound, Site Compound No.1, each working on a different part of the UWF Related Works. The workers will arrive and depart daily to and from the construction compound, parking spaces will be provided at the compound. The various crews will then be transported to the specific works location by means of 'crew-cab' 4x4 vehicles or similar. Bulk deliveries of materials will be delivered to the site compound and stored there until needed. Materials needed at works locations will be transported by way rigid body vehicle or tractor and trailer. Aggregate and concrete will be delivered directly to works locations.

1.3.2 Duration & Timing

The duration and timing of the construction of UWF Related Works is outlined in Table 1 below.

Table 1: Duration and timing of the construction of the UWF Related Works

Construction Activities	Duration of the Construction Stage	Timing of Construction Activities
Pre-Construction - Detailed design, confirmatory surveys, felling, hedgerow/tree removal or pruning etc.	3 - 6 months	Immediately prior to the commencement of the main construction period
Main Construction Activities - Construction of Internal Windfarm Cabling, Realigned Windfarm Roads, Haul Route Works, Telecom Relay Pole and Ancillary UWF Related Works	6 – 8 months	Projected Start Date: 2018/2019 The UWF Related Works will take place during the same period as the construction of the Upperchurch Windfarm and Grid Connection (exceptions listed in Scheduling of Works below)

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

1.3.3 Construction Hours of Work

Normal construction times will be 07.00 to 19.00hrs Monday to Friday and 08.00 – 16.30hrs on Saturdays. These normal hours of work will be further restricted at particular locations as outlined in Scheduling of Works.

1.3.3.1 Scheduling of Works

Scheduling of Works mostly relates to water or biodiversity protection measures. The Scheduling of Works relevant to traffic management are:

- Construction works will be carried out during daylight hours.

- Construction works in Knockmaroe and Knockcurraghbola Commons townlands, which are within 350m of any local residences, will not take place at the same time as other elements of the Whole UWF Project.

1.3.4 Road Works Locations

Haul Route Works will be carried out at thirteen locations in the vicinity of Upperchurch Windfarm. A description of the Haul Route Works at each location is included in the table below.

The **Haul Route Works** will take place on the L4139-0, L4138-12, L6188-0, L2264-50 and the L6185-13 local roads, and mainly comprise works within the public road corridor and consist of widening of the public road into the verge and in some cases, the removal of the roadside boundary and the widening of the road into the boundary or across the boundary into private lands. Soil in the verge will be removed and temporarily stored nearby and hardcore will be laid and compacted on these verges to provide access onto construction works areas on lands adjacent to the road. Any existing drainage channels at these entrances will be piped under the hardcore layer. This hardcore will prevent any damage to the edges of road pavements. This widening of the public road network will facilitate the delivery of the turbine components for the Upperchurch Windfarm. The verges and boundaries will be reinstated following the completion of component deliveries.

Table 2: Description of Haul Route Works

Haul Route Works ID	Description of the Haul Route Works
HW1	Widening of the L4139-0 by 0.5m into both verges for a length of c.120m. Temporary removal of 130m of roadside boundary.
HW2	Widening of the L4139-0 by 1.5m on the eastern side, for a length of c.280m, by moving the roadside drain and roadside boundary (earthen bank) onto agricultural grassland. Temporary removal of 150m of roadside boundary. As a result the existing concrete culvert at watercourse WW31 will be widened by 1m, with minimal interference to the existing structure.
HW3	Widening of bend along the L4139-0 by 1.5m on western side and 3.5m on eastern side in agricultural grasslands for a length of c.70m. Temporary removal of 100m of roadside boundary.
HW4	Widening of the L4139-0 by 1.5m on the eastern side, for a length of c.270m, by moving the roadside drain and earthen bank onto agricultural grassland. Temporary removal of 130m of roadside boundary.
HW5	Construction of 170m of new temporary site access road on agricultural lands between the L4139-0 and the L4138-12. Temporary removal of 40m of roadside boundary.
HW6	Widening of the L4138-12 by 0.5m into both verges for a length of c.170m. Temporary removal of 45m of roadside boundary.
HW7	Widening of Coillte entrance on the R503 by 30m, construction of 40m of new temporary site access road on forestry lands and the use of an existing hardcored yard for turning manoeuvres. Temporary removal of 70m of roadside boundary. Clearance of scrub and use of matting where required.
HW8	Widening of the L2264-50 on the eastern side by 13m for the initial 40m and then by 1.5m for the next 190m, by moving the roadside boundary (earthen bank) onto agricultural grassland. Temporary removal of 180m of roadside boundary.
HW9	Widening of the L2264-50 by 1.5m on the northern side, for a length of c.40m, by moving the roadside boundary (earthen bank) onto agricultural grassland. Temporary removal of 10m of roadside boundary.
HW10	Widening of the L2264-50 by 0.5m on the northern side, for a length of c.40m, by widening into the roadside verge.
HW11	80m of new temporary site access road on agricultural lands between the L2264-50 and the L6188-0. Temporary removal of 20m of roadside boundary.
HW12	Widening of the L6188-0 by 0.5m into both verges for a length of c.280m. Temporary removal of 160m of roadside boundary. As a result the existing concrete culvert at watercourse WW31 will be widened by 1m, with minimal interference to the existing structure.
HW13	Widening of the L6185-13 by 1.5m on the southern side, for a length of c.210m, by widening into the roadside verge. Permanent removal of 25m of roadside boundary. The public road pavement over watercourse crossing WW32 will be widened, by 1m, into the roadside verge with minimal interference to the existing structure.

In summary, the above Haul Route Works include widening of 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.

All public road works will be subject to a Road Opening License ---application to Tipperary County Council and will be carried out in accordance with the Tii Guidelines on the Opening, Backfilling and Reinstatement of Openings in Public Roads. The extensions to the existing structures at HW2 and HW12 will be carried out in accordance with the OPW guidelines Construction, Replacement or Alteration of Bridges and Culverts (2013). The detailed design will be agreed with the Tipperary County Council District Engineer prior to these extension works.

Following the delivery of turbine components to Upperchurch Windfarm, the Haul Route Works areas will be reinstated and roadside boundaries will be put back along their original alignment.

Relevant Volume C3 EIAR Figures:

Figure RW 9: Layout of Haul Route Works on Aerial Photography Mapping

Figure RW 10: Location and Layouts of Haul Route Works (Overview and Maps 1 to 3)

Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:

RW.OCM-06: Haul Route Works

1.3.5 Telecom Relay Pole

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 fenced with 2.4m high palisade fencing; a native hedgerow will be planted on the berm created from the excavations. A communications and low voltage (LV) electricity supply will be cabled 300m to the compound, from the existing supply at the Foilnaman mast. The connection will be by underground cables which will be laid under Realigned Windfarm Road RWR3 and Upperchurch Windfarm Road.

Relevant Volume C3 EIAR Figures:

Figure RW 5.11: Location of the Telecom Relay Pole on Aerial Photography Mapping

Figure RW 5.12: Plan and Elevation of Telecom Relay Pole and Compound

Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:

RW.OCM-07: Telecom Relay Pole

1.3.6 RW Ancillary Works

1.3.6.1 Site Entrances

There is a change of use required for an existing entrance and 14 No. temporary site entrances required, for UWF Related Works. In addition, 11 No. site entrances that are already consented for UWF will be used for the UWF Related Works developments.

1.3.6.2 Change of Use of Existing Agricultural Entrance to Agricultural and Forestry Entrance

Replacement forestry is required for any felled forestry that occurs during the construction works for the whole UWF project. This forestry, the UWF Replacement Forestry, will be planted on lands in Foilnaman. An existing agricultural entrance leading off the L-2264-34 at Foilnaman, will be used to access these UWF Replacement Forestry lands. The existing permanent entrance is a farm entrance only. This will change use to an agricultural and forestry entrance and as before, remain in permanent use. No widening of the entrance is required as the existing sightlines comply with North Tipperary County Development Plan 2010 (as amended) Table 10.1: Sightline Requirements. This entrance is identified on the mapping as EW10.

Relevant Volume C3 EIAR Figures:

Figure RW 5.13: Location of "Change of Use at Existing Entrance" (including sightlines)

1.3.6.3 Temporary Site Entrances

To facilitate the installation of the Internal Windfarm Cabling and the construction of the Haul Route Works for the delivery of turbine components, a total of 14 No. temporary site entrances will be required. These entrances are identified on the mapping as EW. The EW ID number; whether the entrance is existing or new; the type of boundary to be opened and UWF element to which the entrance relates; are listed in Table 3 below.

Table 3: Temporary Site Entrances for UWF Related Works

Entrance ID	Existing Entrance	Type	Relevant part of the UWF Related Works
EW1	No	Earthen bank (removed)	Haul Route Works – HW5
EW2	Yes	Gate and concrete block wall (widened)	Haul Route Works – HW5
EW3	No	Hedgerow (removed)	Internal Windfarm Cable
EW4	No	Hedgerow (removed)	Internal Windfarm Cable
EW5	No	Post and Wire Fence (removed)	Internal Windfarm Cable
EW6	No	Earthen bank (removed)	Internal Windfarm Cable
EW7	No	Post and Wire Fence (removed)	Internal Windfarm Cable
EW8	No	Earthen bank (removed)	Internal Windfarm Cable
EW9	Yes	Farm & House Entrance (no widening)	Internal Windfarm Cable
EW11	No	Hedgerow (removed)	Internal Windfarm Cable
EW12	Yes	Field Entrance (no widening)	Internal Windfarm Cable
EW13	Yes	Yard Entrance - needs to be widened by hedgerow removal	Haul Route Works - HW7
EW14	No	Hedgerow (removed)	Haul Route Works - HW11
EW15	No	Post and Wire Fence (removed)	Haul Route Works - HW11

The above table does not include EW10, as this is a permanent entrance for the UWF Replacement Forestry.

In summary, 4 No. of the temporary site entrances will be through existing farm or forestry entrances. The remaining 10 No. will created by the removal of the roadside boundary, whether fence, earthen bank or hedgerow. Where widening is required, these entrances will be widened to 5m. All these entrances will be opened during the construction stage and closed after construction is complete. In the event of larger components such as blade or tower replacement at Upperchurch Windfarm during the operational phase, these entrances will need to be reopened to facilitate the delivery of the components, and will be closed again directly after the deliveries.

Relevant Volume C3 EIAR Figures:

Figure RW 5.2: Layout of UWF Related Works on Aerial Photography Mapping

Figure RW 5.4: Layout of Internal Windfarm Cabling on Aerial Photography Mapping

Figure RW 5.9: Layout of Haul Route Works on Aerial Photography Mapping

Figure RW 5.14: Plan View of Typical Temporary Site Entrance

Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:

RW.OCM-03: Temporary Site Entrances

1.3.6.4 Temporary Access Roads

During the construction stage, up to 5.3km of temporary access roads will be constructed within the construction works area boundary, to facilitate the movement of machinery and vehicles along the Internal Windfarm Cabling areas. Three methods will be employed to provide temporary access roads, where needed: matting, excavate and fill, or floating road. In general, the method of temporary road construction employed at any particular location will depend on the prevailing soil and weather conditions at the time of construction, and will be determined by the Contractor in conjunction with the Environmental Clerk of Works. The layout and temporary access road cross sections are illustrated on:

Relevant Volume C3 EIAR Figures:

Figure RW 5.4: Layout of Internal Windfarm Cabling on Aerial Photography Mapping

Figure RW 5.15: Cross Section of Temporary Access Roads

Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:

RW.OCM-05: Temporary Access Roads

1.3.7 Construction Material Haulage Routes

The construction materials, which will be brought onto the UWF Related Works areas, are listed in Table 4 below along with details of the quantity and source of the materials.

Table 4: Quantities, type and source of construction materials

Note: The quantities shown below are worst case volumes and will be lower than those stated.

Materials	Quantity	Source of Materials
Concrete	180m³ / 23 No. loads	Roadstone Killough, Co Tipperary Roadstone Bunratty, Co Clare
Aggregate (crushed stone)*Based on use of stone on all temporary access roads. Any stone used for the temporary access roads will be reused in the windfarm roads and hardstands.*	4620m³ / 285 No. loads	Shanballyedmond, Rear Cross
Hard core for temporary public road surface	50m³ / 7 No. loads	Clare
Surface dressing asphalt (public road sections)	12m³ / 2 No. loads	Clare
Geotextile	4 No. loads	Cork
Duct jointing collars	1 No. load	Cork
125mm outer diameter HDPE Duct	12 No. loads	Cork
50mm outer diameter HDPE Comms Duct	4 No. loads	Cork
33KV electrical cable	12 No. loads	Cork
Fibre Optic communication cables	3 No. loads	Cork
Red cable protection strip	1 No. load	Cork
Relay Pole and Telecommunication Equipment	1 No. load	Cork
Yellow warning tape	1 No. load	Cork
Marker posts and plates	1 No. load	Dundrum, Co Dublin
Hedging	1 No. load	Dundrum, Co Tipperary
Fencing materials, posts, rails, wire	1 No. load	Arrabawn Co-Op, Reiska
Precast concrete and HDPE culverts Plastic matting and bog mats	1 No. load	Thurles

Material and Delivery Traffic Management

Aggregate and Concrete

HGV loads of aggregate, concrete and public road dressing will be delivered directly to construction works areas. These HGVs will travel to the works areas using both the regional and local road networks, as specified on Figure RW TMP 2: Haul Routes for Concrete, Aggregate and Other Materials to UWF Site Compound No.1) and Figure RW TMP 3. Haul Route from UWF Site Compound No.1 to Construction Works Areas. These haul routes have been discussed with the Area Roads Engineer.

Other Construction Material

Other materials, such as ducting, geotextile and other construction materials, will be sourced from various suppliers and will be transported to the Upperchurch Windfarm Site Compound No.1 via the national and regional road network, as identified on Figure RW TMP 2.

This material will be stored at Upperchurch Windfarm Site Compound No.1 until required at works areas. Each day a smaller truck will be used to deliver the daily volume of ducting, matting, cable protection strip, warning tape, duct jointing collars etc. to each active works area, as identified on Figure RW TMP 3.

Relevant Volume C3 EIAR Figures:

Figure RW 5.23: Haul Routes for Delivery of Aggregate, Concrete and Other Materials to UWF Site Compound No. 1

Figure RW 5.24: Haul Routes from UWF Site Compound No.1 to Construction Works Areas.

1.3.7.1 Delivery Vehicles - Axles

Delivery machinery will comprise

- Tractor units with 2-4 axel articulated flat-beds or tautliners.
- Standard 4-axel rigid tipper units for aggregate and concrete deliveries.

1.3.8 Reinstatement of Public Roads

Trenches within road pavements will be reinstated in accordance with the Tii Guidelines on the Opening, Backfilling and Reinstatement of Openings in Public Roads. Where the cables trench crosses perpendicular to the road, full width surface overlay to a distance of 5m beyond either side of the trench will be carried out.

Along **construction materials haulage routes**, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and falling weight deflectometer (FWD) surveys will be undertaken along the routes of concentrated construction traffic between the R503 and the site access points. Whilst it is not expected to occur, any damage to structures or road pavements will be repaired to at least as good a condition as pre-works, and on damaged sections of roads where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250, full-width surface overlay will be carried out.

Reinstatement of **roadside boundaries**: All road boundaries at temporary site access points will be reinstated along the existing alignment.

1.4 Traffic Management Measures

Traffic will be managed to ensure that the construction traffic for the UWF Related Works will travel safely and efficiently along the public road network.

1.4.1 Hazards Identified

The Regional roads in the area have adequate carrying capacity for the construction traffic and therefore the critical roads in relation to traffic management are the Local Roads which are located on concentrated haulage routes, see Figure RW TMP 2 and Figure RW TMP 3.

The hazards are

- Higher volume of traffic
- Deliveries of construction materials
- Access and egress at the temporary site entrances
- Spoil and dust deposited on the public road

Diversion of local traffic.

1.4.2 Signage

Signage will be according to the Chapter 8: Temporary Traffic Measures and Signs for Roadworks of the Department of Transport, Tourism and Sport Traffic Signs Manual, November 2015.

The signage layout will take the individual features of the site into consideration. All signs will be manufactured using retro-reflective material and will be a minimum of 750mm X 750mm size. All cones will be 1m high and have reflector sleeves for additional visibility and sand bags will be used to weight down cones.

All temporary traffic signs for will be placed such that they;

- do not obstruct sight lines;
- do not obstruct other signs; and
- are themselves not obstructed by other signs.

Where signs could be obscured by bends, hills or dips in the road, additional warning signs will be put in place.

1.4.2.1 Information Signs

Information signs will be installed at the main site entrances. These signs will give an overview of the construction traffic timetable; the Environmental Clerk of Works contact number, the Community Liaison Officer and will serve as an advance warning to expect HGVs on the road. Informational signage will be black on white background.

1.4.2.2 Directional Signage

Directional signage will be installed at specific locations along the haul routes. All directional signage will be black on white background.

The haul routes for construction material deliveries to the UWF Related Works will have clear directional signs and this signage will be relocated to indicate the location of the UWF Related Works as the works progress.

1.4.2.3 Warning Signage

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

Typical placement of advance warning signage is shown on Figure RW TMP 4: Advance Warning Signage for Road Works & Site Entrances, which is included at the end of this plan.

1.4.3 On-going communication with Tipperary County Council Roads Section

The Project Manager for the construction of UWF Related Works will ensure that close communication with Tipperary County Council Roads Section will be maintained throughout the construction stage. Such communications will include:

- Prior to commencement of construction the Project Manager and the Environmental Clerk of Works will meet with Tipperary County Council Roads Section and agree any specific traffic requirements that they may have or that are subject to planning condition. The project will comply with all directions in relation to timing and the manner in which road works and any road reinstatements are carried out; and

- Ongoing reporting relating to the condition of the road network and updates to construction programming will be provided to Tipperary County Council

1.4.4 Traffic Management Measures

Traffic management control measures are included in the Best Practice Measure (BPM-30) which is included below. The control measures identified will be implemented during the construction of the UWF Related Works.

Traffic Management Measures (Best Practice)			
Title:	**Traffic Management Measures**	**Ref:**	**BPM-30**

Environmental Commitment

Manage traffic to ensure that construction traffic will travel safely and efficiently along the public road network.

Responsibilities

Project Manager	• Consult with Tipperary County Council • Consult with Gardaí • Contractor arrangements regarding speed limits, alert beacons, haulage routes etc. • Oversee the implementation of the Traffic Management Plan
Construction Manager	• Install information, direction and warning signage in advance of road works, site entrances and along haul routes • Implement the Traffic Management Plan
Environmental Clerk of Works	• Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures
Community Liaison Officer	• Act as point of contact with local community, • Keep the local community informed of construction and road works in their area

Traffic Management Measure

Communication and Information

- The Project Manager will keep in contact with Tipperary County Council Roads Section, with a view keeping the Roads Section informed of up to date activities and to avoid any conflicting concurrent works and/or diversions that the Local Authority may have planned at the time of construction;
- Ahead of works in an area, the Community Liaison Officer will inform local residents of the construction and delivery schedule. Residents will also receive a leaflet with an overview of the traffic schedule and the contact information for both the Community Liaison Officer and the Environmental Clerk of Works so that householders and local farmers can make enquiries to levels of usage and provide information on local events or work/activities which may conflict with the construction/delivery schedules.
- The Construction Manager will erect an information sign at the Site Compound No.1 site entrance. This sign will give an overview of the construction traffic timetable; the contact numbers for the Environmental Clerk of Works and the Community Liaison Officer, and will serve as an advance warning to expect construction traffic on the road.
- Directional signage will be installed at specific locations along the haul routes. The haul routes for construction material deliveries to the UWF Related Works will have clear directional signage from the R503 to the temporary site entrances, and this signage will be relocated to indicate the location of the UWF Related Works as the works progresses.
- Advance warning signage will be erected on both approaches to temporary site entrance locations and road works locations. The placement of this signage will be based on the recorded 85th percentile traffic speeds, or the posted limit, whichever is the higher.

Measures for Delivery Personnel

- These Traffic Management Measures will be part of the induction to all haulage companies delivering to site.
- All machinery entering the site will have working rotating beacons and these beacons will be activated to indicate to other traffic of their intention to enter or exit the site.
- All companies delivering aggregate, concrete or other materials to works areas will be instructed to use the designated haul routes and will be informed of designated delivery hours for routine deliveries.

- A speed limit of 50km/hr on the Local Roads between the R503 and R497 and the site entrances will be implemented and communicated to the companies delivering materials to site.
- All material deliveries will have a maximum axle load of 12 tonnes per axle.

Measures for Site Personnel

- A speed limit of 50km/hr will be implemented and communicated to the personnel travelling on the Local Roads between the Site Compound No.1 and the temporary site entrances.
- There will be onsite parking for all construction personnel at the Site Compound No.1.
- There will be no parking of any vehicles on the public road.

Protection of the Public Road Network from Surface water run-off

- To ensure that surface water run-off does not flow onto the public road surface, a concealed drain will be provided parallel to the public road network at the Site Compound No.1.

Measures for Local Residents

- All construction works will be carried out during daylight hours **(Project Design Measure).**
- Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a safe and efficient manner **(Project Design Measure).**
- With the exception of Baurnadomeeny, local access will be facilitated to properties at all times during the construction works on the public road network. No entrances will be blocked and flagmen will used to organise through traffic in the event of the public carriageway being temporarily obstructed.
- Construction works in Knockmaroe and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Grid Connection or Upperchurch Windfarm **(Project Design Measure).**

Measures to minimize debris on road

- In order to minimize mud and debris deposited on roadway surfaces there will be a dry wheel wash facility positioned at the site entrance for the Site Compound No. 1 and will be used by trucks exiting the site.
- In addition to this a road sweeper will operate at all site entrances, as required, for the duration of the construction of the UWF Related Works and in particular, during the importation of aggregates and concrete.
- The road sweeper will keep the roads at sites entrances clean and clear of mud and debris

Road Repair and Reinstatement

- Following the completion of construction works, all road boundaries at temporary site access points or at temporary road widening locations will be reinstated along the existing alignment.
- Following road works for cable trenching, road pavements will be reinstated in accordance with the Tii Guidelines on the Opening, Backfilling and Reinstatement of Openings in Public Roads,
- Where the cables trench crosses perpendicular to the road, full width surface overlay to a distance of 5m beyond either side of the trench will be carried out. Where the cables are aligned along the length of the road, full-width surface overlay will be carried out on any sections of road where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250.
- Along construction materials haulage routes, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken along the routes of concentrated construction traffic between the R503 and the site entrances on the local road network. Whilst it is not expected to occur, any damage to structures or road pavements will be repaired to at least as good a condition as pre-works, and on damaged sections of roads where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250, full-width surface overlay will be carried out.
- Any road repairs if required following the end of the construction stage will be by arrangement with Tipperary County Council.

References

- Department of Transport - Traffic Signs Manual: Chapter 8 - Temporary Traffic Measures and Signs for Roadworks of the Department of Transport, Tourism and Sport Traffic Signs Manual, November 2015
- Opening, Backfilling and Reinstatement of Openings in Public Roads (Transport Infrastructure Ireland, September 2015)

1.5 Emergency Services

Emergency services vehicles will have priority over construction traffic vehicles at all times.

The telephone numbers for the Emergency Services are listed in Table 5 below;

Table 5: Emergency Contact Numbers

Emergency Service	Contact Number
Fire Brigade, Gardaí and Ambulance	Dial 112
Local hospital (University Hospital Limerick)	Dial 061 301111 (Main Switch) or 061 482343 (A&E)
Utilities - ESB Networks	Dial 1850 372 999
Utilities – Eir	Dial 1850 245 424
PSCS appointed by the construction contractor for the windfarm	TBC

These numbers will be prominently posted at the site entrances and in the site offices.

If an incident occurs due to construction traffic the PSCS will provide all necessary assistance to the Gardaí, Ambulance and Fire Brigade services and local authority to deal with the emergency.

In the case of an emergency on the public road, the following incident management procedure will be followed:

- Emergency Services will be contacted immediately by dialling 112
- Exact details of the emergency / incident will be given by the caller to the emergency line operator to allow them to assess the situation and respond in an adequate manner
- The emergency will then be reported to the PSCS
- Flagmen will be deployed to warn and slow down any oncoming traffic.
- The PCSC will notify all other construction traffic in the area of the incident and
- The PCSC will ensure that personnel are available to guide the emergency services to the accident location.

All incidents will be recorded by the PSCS and remedial measures taken where appropriate. The incident management procedure will be part of the induction of all personnel coming onto the construction site including HGV drivers delivering to the site.

1.6 Figures and Mapping

Title:
Figure RW TMP 1

Location of UWF Related Works on OSI Discovery Mapping

Map Number:
Map 1 of 1

Legend:

- Haul Route Works
- Haul Route Works Numbers (HW1 - HW13)
- Realigned Windfarm Road
- Realigned Windfarm Road Numbers (RWR1 - RWR3)
- Internal Windfarm Cabling
- Telecom Relay Pole
- Upperchurch Windfarm (UWF)
- Upperchurch Windfarm Site Compound No.1
- Regional Road Number

Project:
UWF Related Works (RW)

Drawn by	Checked by	Date	Sheet Size
AB	JB	29-Mar-18	A3

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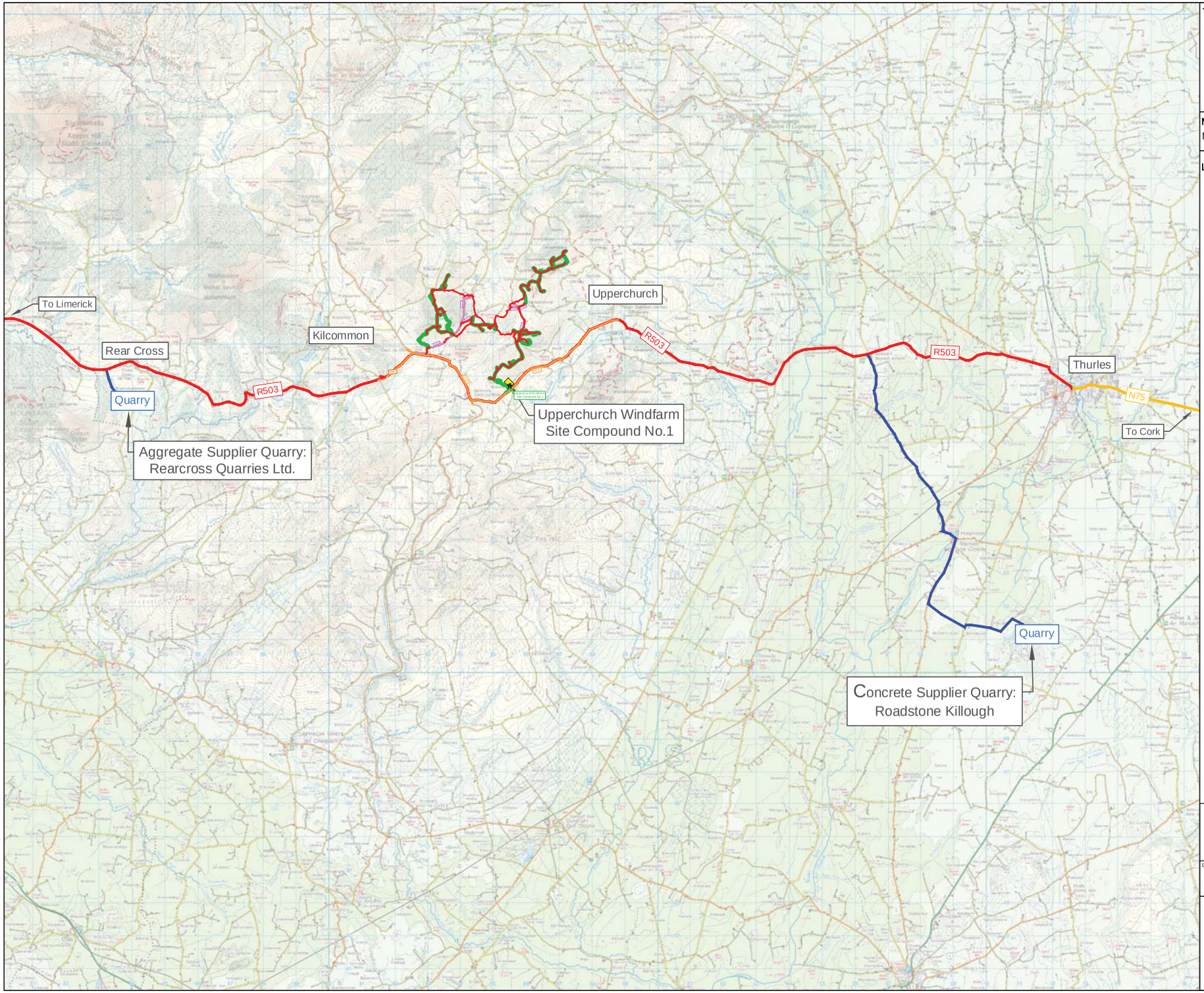
ECOPOWER



Title:

Figure RW TMP 2

Haul Routes for Delivery of Aggregate, Concrete and Other Materials to UWF Site Compound No.1

Map Number:

Map 1 of 1

Legend:

- Haul Route from Local Quarries to the R503
- Regional Road R503
- National Road N75
- Upperchurch Windfarm Site Compound No.1
- Local Roads used to access the UWF Related Works Areas
- Consented UWF Roads used to access the UWF Related Works Areas

N

Project:

UWF Related Works (RW)

Drawn by:	Checked by:	Date:	Sheet Size:
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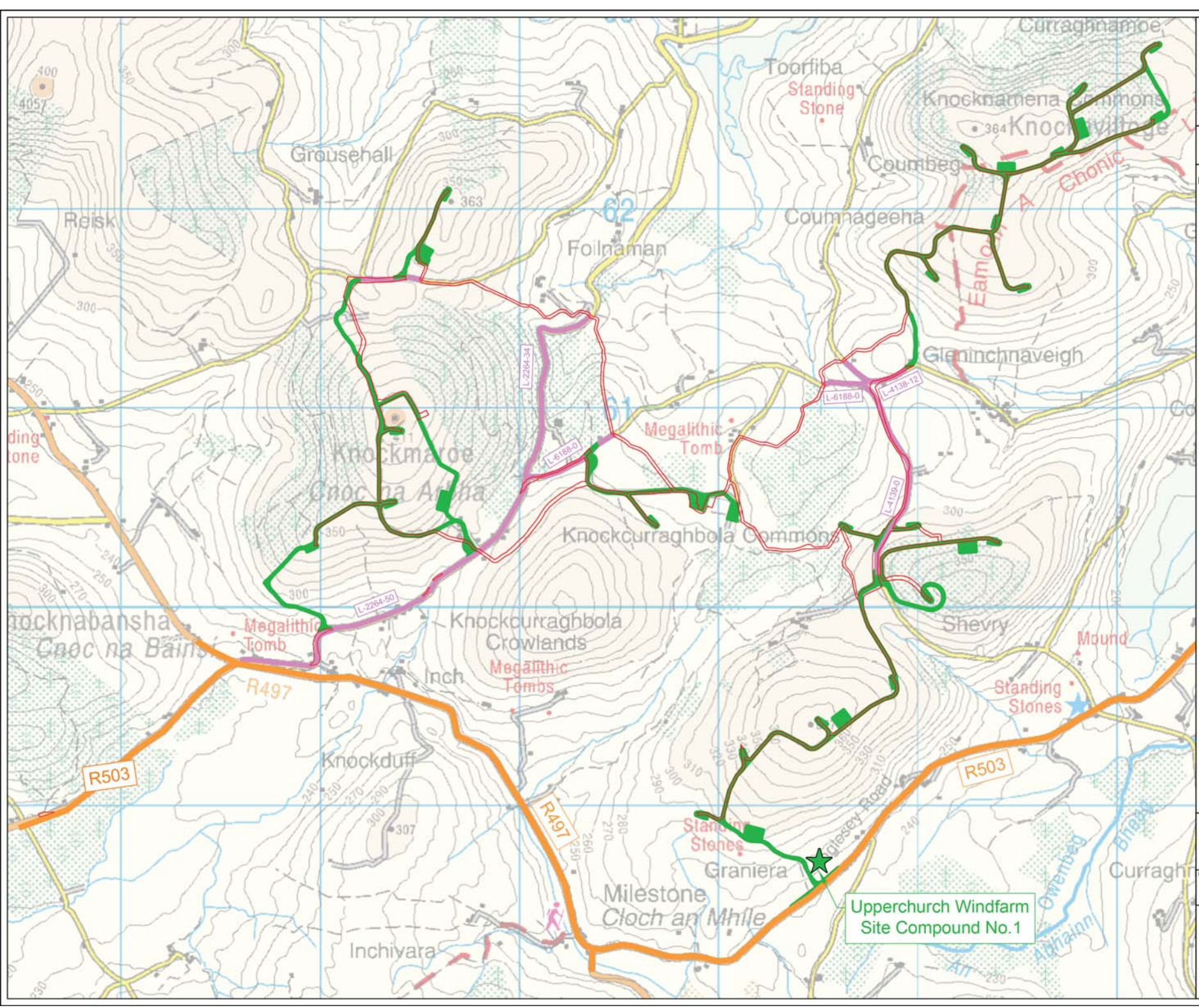

Title:

Figure RW TMP 3

Haul Routes from UWF Site Compound No.1 to Construction Works Areas

Map Number:
Map 1 of 1

Legend:

- UWF Related Works Construction Works Area
- Haul Route along local roads from the R503 or the Upperchurch Windfarm Site Compound No.1 to the UWF Related Works Areas
- Consented UWF Roads
- Upperchurch Windfarm Site Compound No.1
- Regional Road
- (L-4138-12) Public Road Number

Project:
UWF Related Works (RW)

Drawn by:	Checked by:	Date:	Sheet Size:
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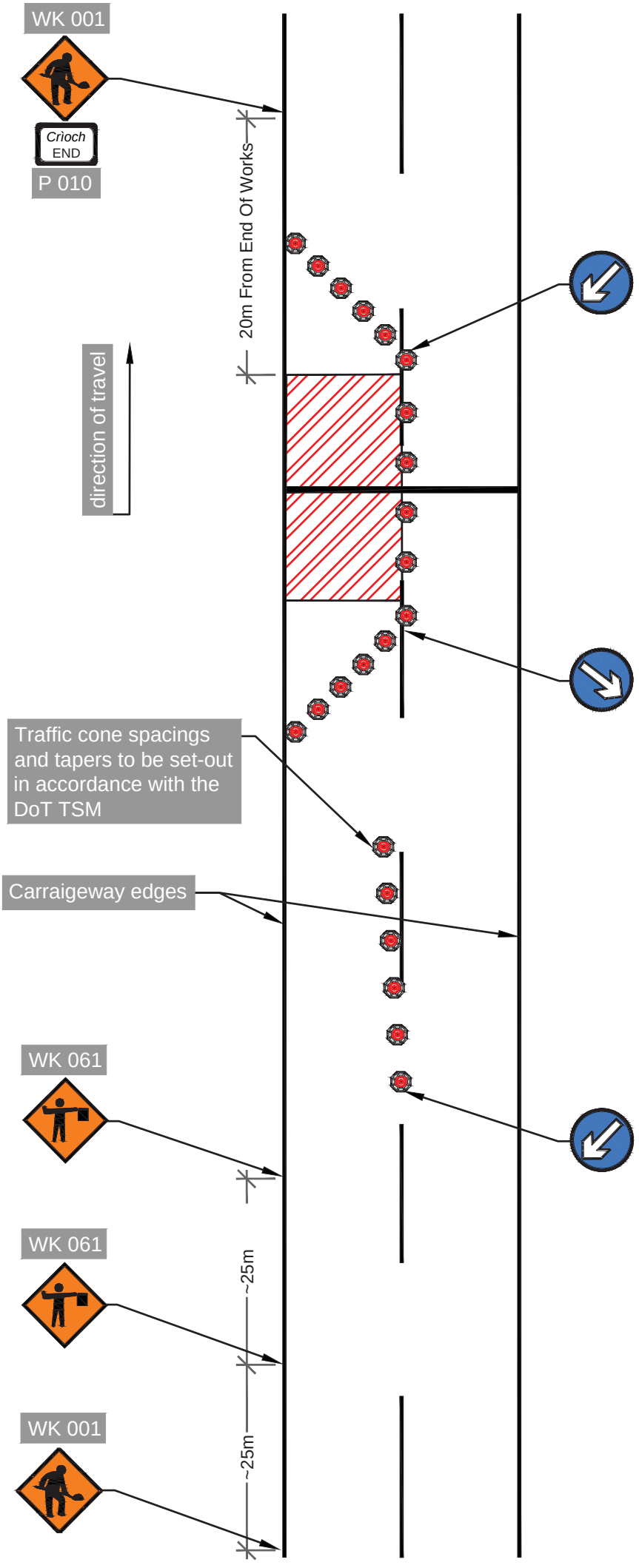

Title:

Figure RW TMP 4

Advance Warning Signage for Half Lane Closures

Designed in conjunction with

NRB consulting engineers

Note: This drawing is not to scale

Department of Transport Traffic Signs Manual (DoT TSM)

Project:

UWF Related Works (RW)

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ECOPOWER

UWF RELATED WORKS

VOLUME D
REVISED ENVIRONMENTAL MANAGEMENT PLAN

Tab 4
Surface Water Management Plan

ECOPOWER

January 2019

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UPPERCHURCH WINDFARM RELATED WORKS, CO. TIPPERARY

CONSTRUCTION PHASE SURFACE WATER MANAGEMENT PLAN

FINAL REPORT

Prepared for:
Ecopower Developments Ltd

Prepared by:
Hydro-Environmental Services

DOCUMENT INFORMATION

DOCUMENT TITLE:	**UWF RELATED WORKS –CONSTRUCTION PHASE SURFACE WATER MANAGEMENT PLAN**
ISSUE DATE:	**29TH MARCH 2018**
PROJECT NUMBER:	**P1299-2**
PROJECT REPORTING HISTORY:	**P1299-1** **P1299-0**
CURRENT REVISION NO:	**P1299-2 - REV 0 – FINAL REPORT**
AUTHOR(S):	**MICHAEL GILL** **DAVID BRODERICK**
SIGNED:	 _____ **Michael Gill B.A., B.A.I., M.Sc., Dip. Geol., MIEI** **Managing Director – Hydro-Environmental Services**

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TABLE OF CONTENTS

FIGURES

FIGURES (IN TEXT)

TABLES

APPENDICES

1. INTRODUCTION

1.1 BACKGROUND

This document presents a Surface Water Management Plan (SWMP) and pollution prevention measures which will be implemented during the construction of the Upperchurch Windfarm (UWF) Related Works, Co. Tipperary. The location of the UWF Related Works area is shown on **Figure A** below.

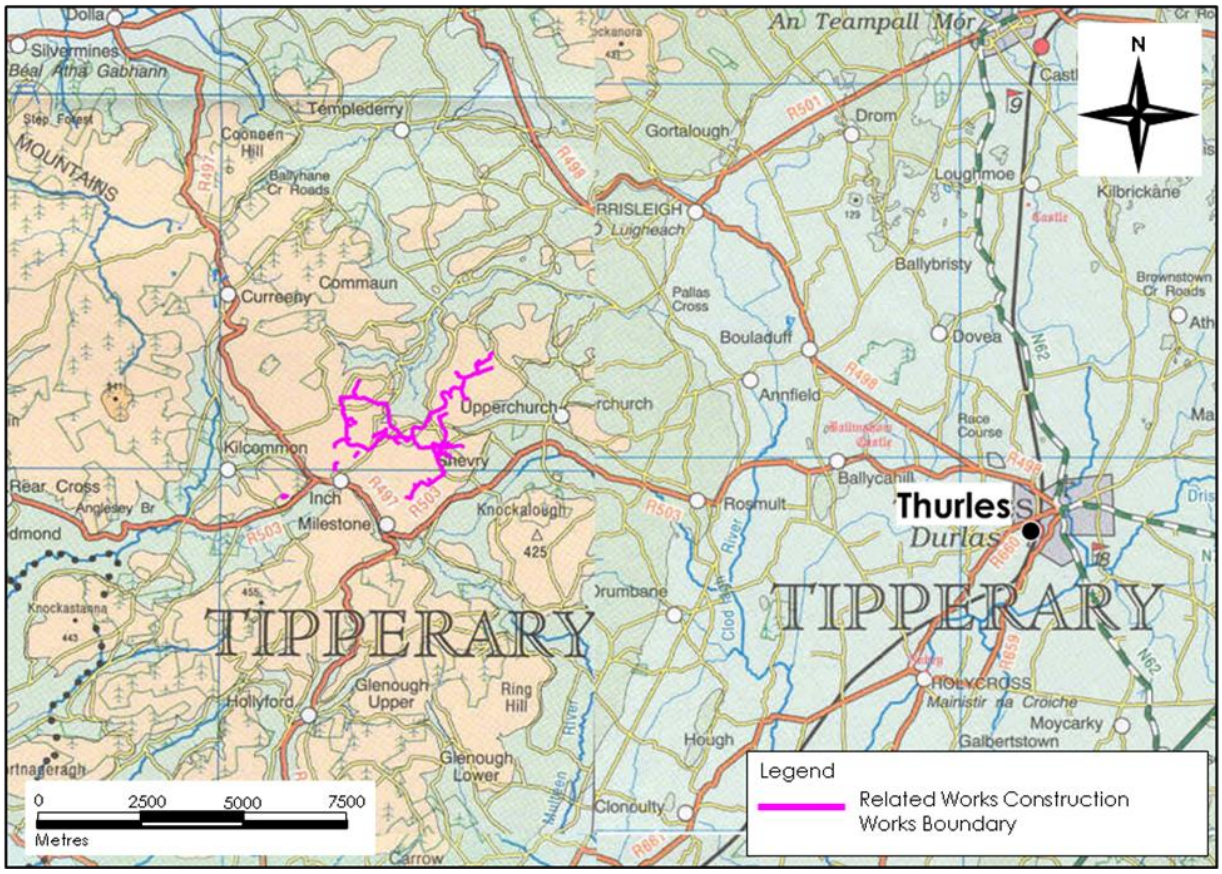


Figure A: Site Location Map

The following Surface Water Management Plan (SWMP) provides the water management framework for the appointed Contractors and Sub-contractors and it incorporates the mitigating principles described in the accompanying Environmental Impact Assessment Report (EIAR) prepared by Ecopower Developments Ltd (February, 2018, refer to Chapter 11 – Water) to ensure that work is carried out with minimal impact on the surface water environment and in accordance with the mitigation measures and project design commitments made in the EIAR.

This report describes briefly the existing geology and hydrology at the site, and then sets out the proposed measures required for surface water management during the construction of the UWF Related Works.

Design, management and mitigation proposals are presented for the following:

- Project Design Measures;
- Best Practice Measures;
- Pollution Prevention Measures; and,
- Watercourse Crossing Hydraulic Design Measures
- Emergency Response Measures

The SWMP also outlines the proposed surface water monitoring plan for the construction of the development. This plan has been prepared in part through consultation with Inland Fisheries Ireland.

The surface water drainage plan for the UWF Related Works was developed by Hydro-Environmental Services.

1.2 DEVELOPMENT DESCRIPTION

The UWF Related Works comprises the following main proposed elements:

- Internal Windfarm Cabling (17.9km)
- Realigned Windfarm Roads (3 no. sections, total length 630m)
- Haul Route Works (13 no. locations)
- Telecom Replay Pole
- Related Works Temporary Access Roads (5.3km)and,
- Ancillary Related Works Works

The Internal Windfarm Cabling will connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables in agricultural; forestry lands; and across public roads; in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. Approximately 62% of the Internal Windfarm Cabling is located under Consented UWF Roads or Realigned Windfarm Roads, the remaining Cabling is located in the vicinity of the windfarm site.

The Internal Windfarm Cabling consists of electrical cables, communication cables and the copper conductor cables which are installed inside High Density Polyethylene (HDPE) ducting in underground trenches. Cable Protection and Warning Tapes will also be laid in the trench. 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.

The Realigned Windfarm Roads are two sections of the already consented windfarm roads which require realignment and one length of new road to link a telecoms mast to the windfarm road. These changes are proposed for windfarm roads in agricultural and forestry lands in the townlands of Shevry, Knockmaroe, and Grousehall, which are all within the Upperchurch Windfarm site.

The Haul Route Works are proposed for public road verges, roadside boundaries and grassland fields located adjacent to the L4139-0, L4138-12, L2264-50, L6188-0, L6185-13 and R503 roads 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; temporary removal or part-removal of roadside boundaries; opening of temporary entrances and the construction of temporary access roads on private lands.

The Telecom Relay Pole is an 18m wooden pole proposed for a location in Knockmaroe townland, close to the existing Foilnaman Mast. The Relay Pole will be contained within a small compound, and a low voltage power and communications supply will be provided from the existing Foilnaman Mast. A short length of access road, Realigned Windfarm Road will provide access to the Telecom Relay Pole from the Consented UWF Road network.

RW Ancillary Works will facilitate the construction of the UWF Related Works and will include temporary access roads; temporary and permanent watercourse crossings (labelled WW1 – WW32 on the attached mapping); temporary site entrances; change of use from 'agriculture' to 'forestry and agriculture' at the UWF Replacement Forestry entrance at Foilnaman; along with forestry felling; temporary and permanent hedgerow/tree removal; permanent hedgerow replanting; fencing; relocation of existing telephone poles and temporary storage of excavated materials; at various locations within construction works area boundaries.

There are 32 no. watercourse crossings at the UWF Related Works areas and the majority of these are located along the route of the Internal Windfarm Cabling. There will also be a requirement to construct 9 no. permanent watercourse crossing structures (culvert/bridge) along the UWF Related Works to allow access during the construction and operational phases.

1.3 SITE DESCRIPTION AND TOPOGRAPHY

The UWF Related Works are located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knocknabansha, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin which exists approximately 2km to the west of Upperchurch in Co. Tipperary. The site is located on a series of small hills and drumlins. The hills are at elevations of between 350m and 400m. The current land use is grassland and forestry. Existing drainage at the UWF Related Works areas mainly comprises manmade drains with some small headwater streams.

1.4 OUTLINE OF THE SURFACE WATER MANAGEMENT PLAN

This document aims to set out the proposed procedures and operations to be utilised on the proposed UWF Related Works project to mitigate against any water related environmental impacts. The project design mitigation measures and best practice control measures outlined herein and the EIAR will be employed on site during the construction phase of the project.

The main areas of water related concerns covered by this document are:

a) Measures for protection of surface water quality during watercourse crossing works;
b) Earthworks (*i.e.* infrastructure & drainage) and surface water quality protection;
c) Temporary and permanent overburden storage areas water management;
d) Fuel usage, storage and management;
e) Cement based compounds;
f) Tree felling drainage controls;
g) Working at or near existing streams / watercourses;
h) Design of new permanent watercourse crossing structures to prevent flood risk; and,
i) Protection of local surface water supplies.

1.5 SWMP REPORT STATUS

The SWMP is considered a live document and will be modified over time as detailed contractor methods of work are developed. If the development is permitted an updated version of this document will be issued to all parties involved in the construction process as necessary.

1.6 RELEVANT LEGISLATION & GUIDANCE

It is proposed that all surface water control measures relating to the UWF Related Works will be constructed using best practice and in conformance with the requirements of the relevant regulatory authorities.

1.6.1.1 Relevant legislation

The key legislation which will be adhered to are defined as follows:

- Water Framework Directive (2000/60/EC);

- Local Government (Water Pollution) Act, 1977–1990;
- Water Quality (Dangerous Substances) Regulations, 2000;
- Arterial Drainage Act, 1945;
- S.I. No. 41 of 1999 Protection of Groundwater Regulations, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);
- S.I. No. 249 of 1989 Quality of Surface Water Intended for Abstraction (Drinking Water), resulting from EU Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (repealed by 2000/60/EC in 2007);
- S.I. No. 439 of 2000 Quality of Water intended for Human Consumption Regulations and S.I. No. 122 of 2014 European Communities (Drinking Water) Regulations;
- S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations; and,
- S.I. No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010.

1.6.1.2 Drainage and Water Quality Management Guidance Documentation

The key drainage and water quality guidance documentation relevant to this project are defined set out as follows:

- Watercourse crossing works 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; and,
    - Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board.

- 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 fire fighting 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.

- Forestry related guidance (*these guidelines below provide drainage management recommendations for roads (very similar to those proposed for the related works construction)*

in upland areas, and these recommendations are therefore very useful at all upland sites, regardless of whether forestry is present or not):

- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Forest Service (not dated): Forestry and Freshwater Pearl Mussel Requirements – Site Assessment & Mitigation Measures. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the design, construction and management of forest roads.

2. EXISTING HYDROLOGICAL REGIME

2.1 INTRODUCTION

The existing geological and hydrological regime along the works is assessed in Chapter 10 (Soils) and Chapter 11 (Water) of the EIAR for the UWF Related Works. Only a brief summary of geological and hydrological data is provided below in order to put the SWMP into perspective.

2.1.1 Existing Geological Regime

The superficial geology (*i.e.* overburden) along the UWF Related Works comprises mainly mineral soil or organic topsoil over glacial tills. Some shallow peat is present along the off-road forestry sections.

The underlying bedrock along the UWF Related Works comprises Silurian meta-sediments.

2.1.2 Existing Hydrogeological Regime

The proposed development is located within 2 no. local groundwater bodies (GWBs) - the Slieve Felim GWB and the Templemore A GWB. Both these GWBs have been classified as "Good Status" by the Water Framework Directive (WFD) characterisation process.

Within both GWBs, the UWF Related Works construction works areas are underlain by Poor Bedrock Aquifers.

The groundwater flow regime of both bedrock types is typically poorly productive. These bedrock aquifers generally have no inter-granular permeability.

Local groundwater flow directions will mimic topography whereby flow paths will be from topographic high points to lower elevated discharge areas at local streams.

2.1.3 Existing Hydrological Regime

On a regional scale the UWF Related Works are mainly located within River Suir (South Eastern River Basin District) with some of the works extending into the River Shannon catchment (Shannon River Basin District).

Approximately 16.2km of the 17.9km Internal Cabling is located in the River Suir catchment while the remainder (1.7km) is located within the River Shannon catchment.

Four of the 13 no. Haul Route Works areas are located in the River Shannon catchment while the remainder (9 no. locations) are located within the River Suir catchment. The Telecom Relay Pole and the Realignment Windfarm Roads are in the River Suir catchment.
Within the River Shannon catchment, the UWF Related Works exist within the regional Mulkear River catchment. The local surface water body within the Mulkear River catchment that the UWF Related Works is in is the Bilboa River (refer to **Table A** below). A Local hydrology map is attached below as **Figure SWMP 1**.

Within the River Suir catchment, the UWF Related Works exist within the regional Clodiagh River catchment. The local surface water bodies within the Clodiagh River catchment that the UWF Related Works are located within include the Clodiagh River (Local), Turraheen River and Owenbeg River.

As stated above, the works for the UWF Related Works crosses 32 no. watercourses and the number of crossings within each sub-catchment is also shown in **Table A** below.

Table A: Summary of Regional and Local Hydrology at UWF Related Works

Regional Catchment	Sub-catchment	Length of Internal Windfarm Cabling (km)	Haul Route Works	Realigned Windfarm Roads	No. Watercourse Crossings
Clodiagh (Suir)	Turraheen River	0.88	n/a	n/a	0
	Clodiagh River	11.44	HW1-6, HW11-13	RWR1 RWR2	26
	Owenbeg River	3.84	n/a	RWR3	5
Mulkear (Shannon)	Bilboa River	1.74	HW7-10	n/a	1

2.1.4 Local Drainage Features

A detailed survey of all proposed watercourse crossings along the UWF Related Works was completed as part of the EIAR assessment. The walkover surveys were completed in the winter months of 2016 and 2017 and therefore streams and rivers were seen in medium to high flow conditions.

Due to the upland nature of the UWF Related Works areas, most of the watercourses in proximity of the works area are drains or small headwater streams. A summary of the watercourse types intercepted by the UWF Related Works are shown in **Table B** below. The locations of the watercourse crossings are shown on **Figure SWMP 2** attached.

Table B: Watercourse Crossing Types along the Works

Type	Watercourse Description	Total No.
1	EPA mapped blue line, major river or stream	1
2	Headwater Stream, equivalent to EPA blue line but not mapped	5
3	Ephemeral watercourse, heavily vegetated with low or no flow during dry periods	2
4	Manmade Drain	24
	Total	**32**

2.1.5 Flood Risk Assessment

The OPW Indicative Flood Maps have no records of recurring flood incidences at the UWF Related Works areas or immediately downstream of them (refer to **more** than 15km downstream in the Clodiagh River.

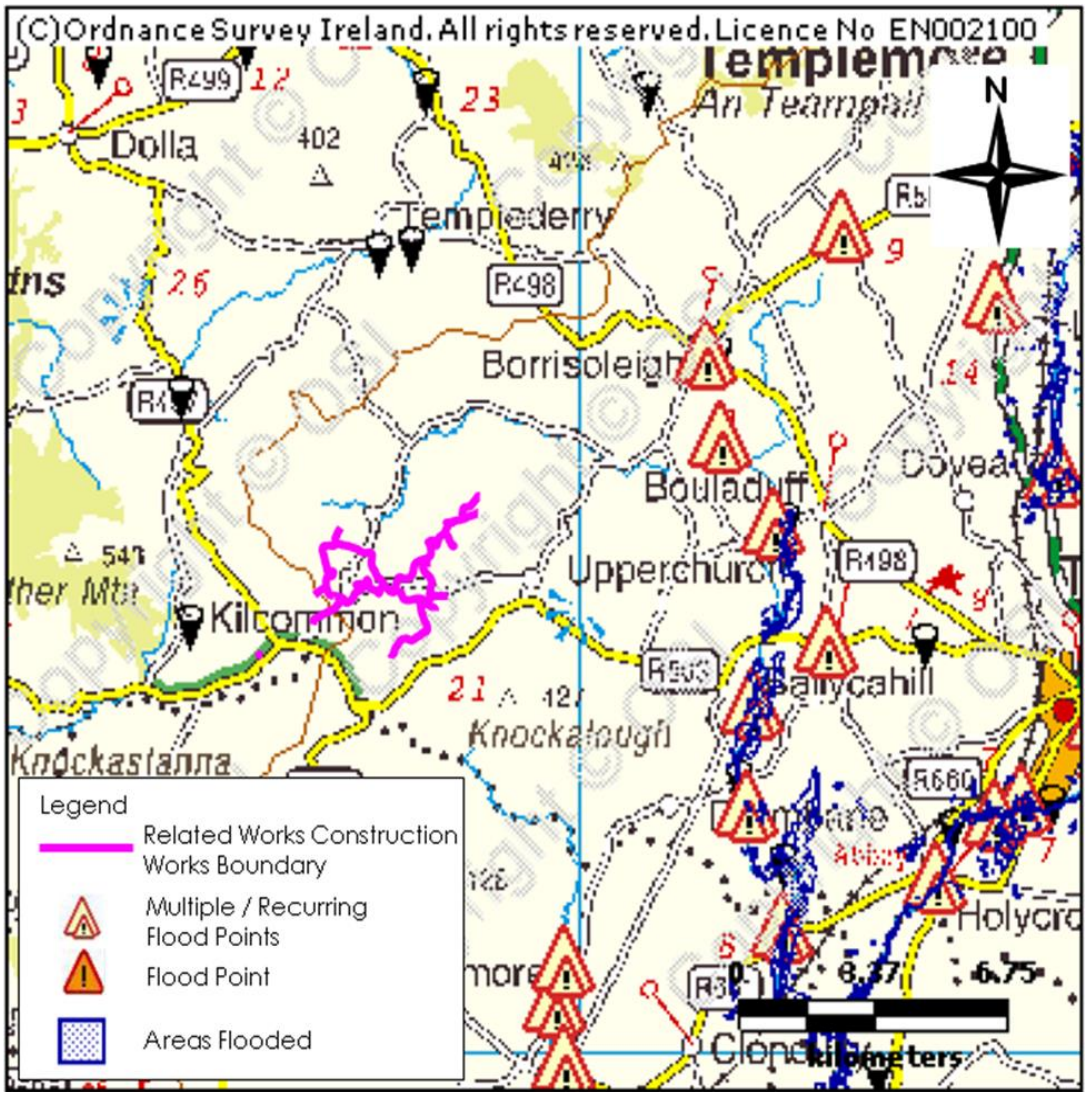


Figure B below). The closest mapped recurring flooding event is more than 15km downstream in the Clodiagh River.

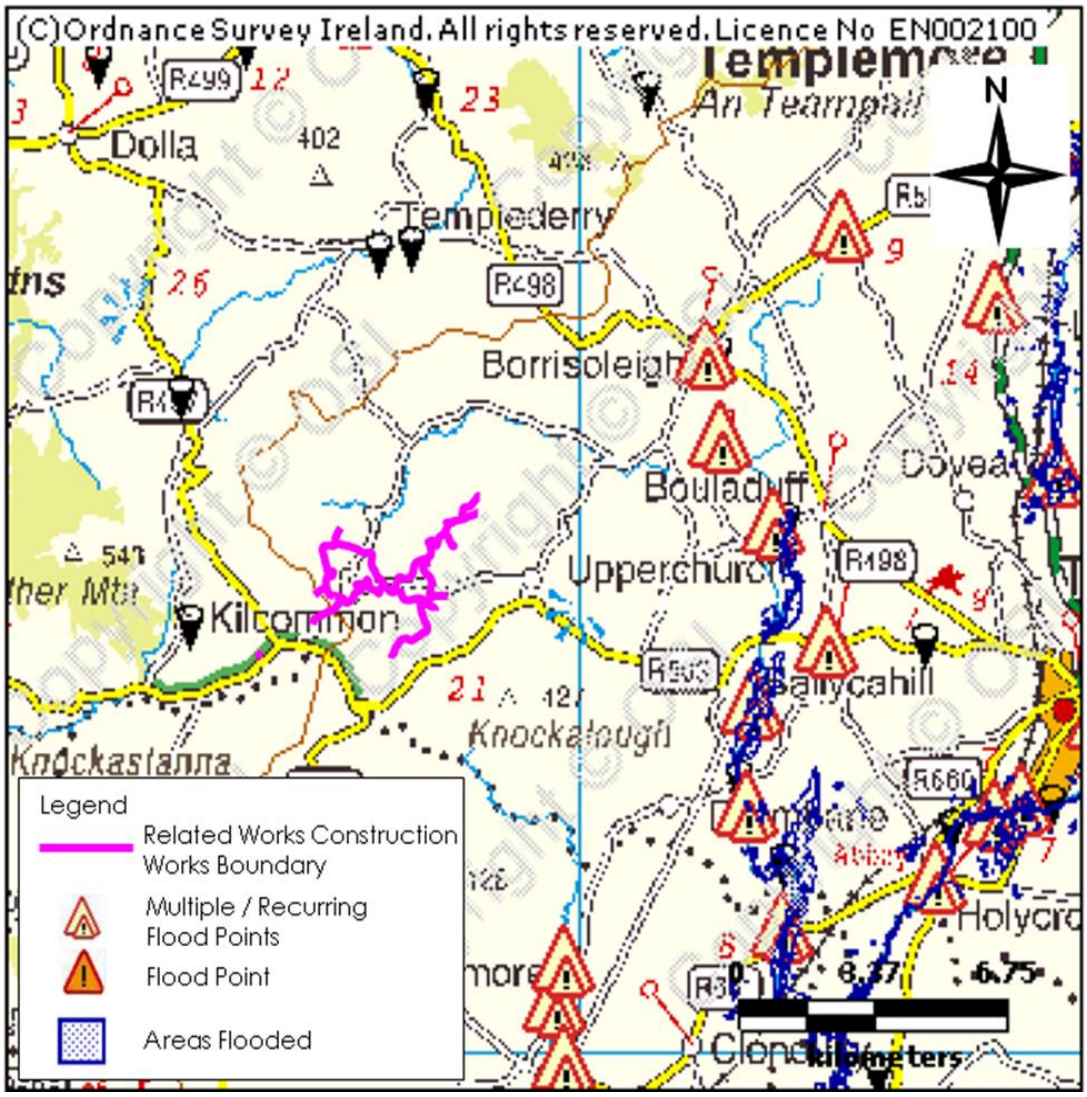


Figure B: OPW Flood Hazard Mapping **(www.floods.ie)**

Where complete the Catchment Flood Risk Assessment and Management (CFRAM)[1] OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the Preliminary Flood Risk Assessment Maps (PFRA) maps. CFRAM mapping is not currently available for the area of the UWF Related Works and therefore the PFRA mapping was consulted.

The OPW PFRA mapping relevant for the UWF Related Works is PFRA Map no. 150. (www.cfram.ie/pfra/interactive-mapping/).

Due to the elevated nature of the majority of the construction works areas, the UWF Related Works areas are not located within any mapped PFRA fluvial or pluvial flood extent zones and are considered to be areas at low risk to flooding (located within fluvial Flood Zone C (Low Risk).

The UWF Related Works largely involves the installation of underground cables for the UWF Related Works. These elements of the development have no potential to increase flood risk due to their subsurface nature. The ground will be reinstated back to its natural condition after the works are completed.

[1] *CFRAM is Catchment Flood Risk Assessment and Management. The national CFRAM programme commenced in Ireland in 2011, and is managed by the OPW. The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.*

There are certain elements of the permanent infrastructure that will be above ground level such as new permanent watercourse crossing structures (i.e. culverts and bridges). Measures to reduce flood risk are outlined below in this SWMP.

2.1.6 Designated Sites

The Lower River Suir SAC consists of all of the freshwater stretches of the 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 of the tributaries including the Clodiagh, the Lingaun, Anner, Nier, Tar, Aherlow and Multeen. With respect to the UWF Related Works, the Clodaigh River, Multeen River and Owenbeg River downstream of the development are within the Lower River Suir SAC.

Within the River Suir catchment, the majority of the UWF Related Works (16.2km of the total 17.9km of Internal Cabling, 9 no. of 13 no. Haul Route Works locations, Telecom Relay Pole and Realigned Windfarm Roads) are located upstream of the Lower River Suir SAC. In total, within the River Suir catchment there are 31 no. (of 32 no.) watercourse crossings at the Related Works areas. Of the 31 no. watercourse crossings within the River Suir catchment, 26 no. are at least 12km upstream (Clodiagh River catchment) of the Lower River Suir SAC and the remaining 5 no. are at least 3km upstream of the SAC (Owenbeg River catchment).

The Lower River Shannon SAC 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.

Some of the UWF Related Works (1.7km of the total 17.9km of Internal Cabling, 4 no. of 13 no. Haul Route Works locations) are located within the River Shannon surface water catchment. The Bilboa River downstream of the works is within the Lower River Shannon SAC. There is 1 no. watercourse crossing required for the UWF Related Works within the River Shannon catchment and this is at least 4km upstream of the Lower River Shannon SAC.

Best practice surface water management mitigation measures will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses as described in Section 3 below.

3. SURFACE WATER MANAGEMENT & POLLUTION PREVENTION

3.1 PROJECT DESIGN MEASURES

3.1.1 Introduction

At the conception of the Project, the design team evaluated the potential or likely significant effects of the development, on the receiving environment. Any potential or likely significant effects were avoided, in most cases, by integrating mitigation measures into the fundamental design of the development. Various measures, particularly options for mitigation by avoidance and mitigation by prevention are proposed.

3.1.2 Project Design Mitigation Measures

The project design measures relating to the water environment are shown in **Table C** below.

Table C: Water Related Project Design Mitigation Measures

PD No. / Impact Source	Project Design Measures
Sediment / Suspended Solids	
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.
PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.
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.
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.
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).
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.
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.
Oils and Fuels	
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse
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. All fuel will be stored in bunded, locked storage containers.
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.
PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells.
Cement Based Compounds	
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
Flood Risk	
PD09	New permanent access 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.
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.
PD25	All new permanent culverts on Class 1 and Class 2 type watercourses will be bottomless or clear spanning.
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 in-stream 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.

3.1.3 Phasing of Works

In an effort to reduce the potential for localised in-combination effects on surface water quality from the main sediment sources during construction works (i.e. Watercourse Crossing Works, Earthworks, Tree Felling and Excavation Dewatering), it is built into the proposed works as a Project Design Measure (PD12) that a phased approach will be undertaken during the construction works, particularly where works within 50m of a watercourse are required (Class 1 and Class 2 Watercourse).

It is proposed that within any local surface water catchment, these works will be completed separately by using following the below phased approach:

- Tree Felling;
- Earthworks (excavations, access road construction, trench excavation and overburden storage);
- Excavation Dewatering (i.e. cable trench dewatering where required); and,
- Watercourse Crossing Works (particularly where in-stream works are required).

Not all the activities listed above will be required at all locations (tree felling and excavation dewatering will only be required at a number of locations. Earthworks and watercourse crossings will be the main activities required throughout the works area and importantly these activities will be completed at separate times.

For example, after the completion of the earthworks (i.e. access road construction and trench excavation) up to a point where a stream crossing is required, all temporary or permanent drainage / runoff control measures will have been put in place prior to the commencement of the watercourse crossing works to help reduce the potential for localised in-combination effects on

surface water quality. In other words, the watercourse crossing works such as open trenching / excavation pumping will not commence until the earthworks in the local catchment has been completed and the relevant surface water control measures have been put in place).

3.2 BEST PRACTICE MEASURES

A key component of the SWMP is the Best Practice Measures (BPMs). A BPM has been prepared for each of the main construction activities that have the potential to impact on the surface water environment. The BPMs are listed in **Table D** below.

Table D: Water Related Project Design Mitigation Measures

BPM No.	Best Practice Measure Title
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-03*	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Use
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

*'It is not planned to divert any watercourse for the UWF Related Works and this Best Practice Measure is included here on a precautionary basis'.

The Best Practice Measures for the UWF Related Works are included in full in Tab-4 of the Environmental Management Plan.

3.3 INTERACTION WITH CONSENTED WINDFARM DRAINAGE

A Sediment Control Plan (prepared by Malachy Walsh and Partners Consulting Engineers), which includes a surface water drainage and attenuation network, forms part of the consented Upperchurch Windfarm development.

A stated above, approximately 62% of the Internal Windfarm Cabling is located within the Consented UWF Roads or Realigned Windfarm Roads (the remaining cabling is located in the vicinity of the windfarm site). Where the UWF Related Works are located within the capture zone of the windfarm drainage (such as the 62% of the Internal Windfarm Cabling), any runoff from the Related Works construction area will be contained and treated by the windfarm drainage.

3.4 EMERGENCY RESPONSE MEASURES

In the unlikely event of a significant pollution occurrence in local surface waters relating to the works then the following protocol will be adopted:

- Water quality monitoring will be undertaken visually, and the contractor will have informed the Environmental Clerk of Works of any observed issues
- If the source is from the works then the Environmental Clerk of Works will notify an appropriate person in Tipperary County Council
- Work will not continue again until the source of the pollution is identified and eliminated

4. WATER RELATED MONITORING PLAN

4.1 DRAINAGE INSPECTION & MAINTENANCE

Drainage control and maintenance will form part of the civil works contract requirements. During the construction phase the effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treatment of potentially silt-laden water from the works areas will be monitored periodically (daily, weekly, and event based monitoring, *i.e.* after heavy rainfall events) by the Environmental Clerk of Works.

The Construction Manager will respond to changing weather and drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained. Regular inspections of all existing and installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water along the works area. Any excess build up of silt levels at check dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed.

The following periodic inspection regime is proposed which will be recorded:

- Daily general visual inspections by Environmental Clerk of Works;
- Weekly (existing & new drains) inspections by site Construction Manager;
- All inspection to include all elements of drainage systems;
- Inspections required to ensure that drainage systems are operating correctly and to identify any maintenance that is required;
- Any changes, such as discolouration, odour, oily sheen or litter should be noted and corrective action should 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:
    - >10 mm/hr (*i.e.* high intensity localised rainfall event);
    - >25 mm in a 24 hour period (heavy frontal rainfall lasting most of the day); or,
    - Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
- Monthly site inspections by the Project Hydrologist during construction phase; and,
- Quarterly site inspections by independent hydrologist during the construction phase and for a period of 6 months following construction.

4.2 SURFACE WATER QUALITY MONITORING

4.2.1 Field Monitoring

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.

4.2.2 Sampling Locations

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 (no. 6 in total) within the local surface water bodies (i.e. Clodiagh River, Owenbeg River, Turraheen River and Bilboa River) are shown on **Figure SWMP 3**.

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.

Coordination of the flow monitoring and continuous monitoring (maintenance and downloading and data management) will be undertaken by the Environmental Clerk of Works.

4.2.3 Laboratory Analysis

Laboratory analysis of water samples will also be undertaken as part of the monitoring programme by an independent and appropriately certified laboratory.

Coordination of the laboratory sampling and analytical programme will be undertaken by the Environmental Clerk of Works. Samples will be dispatched for analysis under chain of custody procedures. Laboratory analytical results will be sent to the Environmental Clerk of Works who will relay data onto the Project Hydrologist and Project Ecologist for their independent review.

Interpretation and reporting of both the field and laboratory data will be the responsibility of the Environmental Clerk of Works.

Proposed parameter suite for hydrochemistry analysis at the monitoring locations is shown in **Table E** below.

Table E: Parameter Suite for Surface Water Monitoring

• pH (field measured)	• Soluble Iron
• Electrical Conductivity (field measured)	• Ammonia N
• Nitrate	• Total Petroleum Hydrocarbons
• Ortho-Phosphate	• Total Suspended Solids
• Phosphorus	• Turbidity
• Biological Oxygen Demand	• Total Dissolved Solids
• Temperature (field measured)	
• Chloride	

4.2.4 Monitoring Frequency

Monitoring frequency will be specified and finalised following consultation with Inland Fisheries Ireland and Tipperary County Council prior to commencement of construction.

As a minimum, the monitoring programme will include:

- Daily visual checks;
- Weekly sampling for suspended solids and turbidity in catchments where tree felling, earthworks or watercourse crossing work is on-going and monthly monitoring for all other parameters;
- 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.

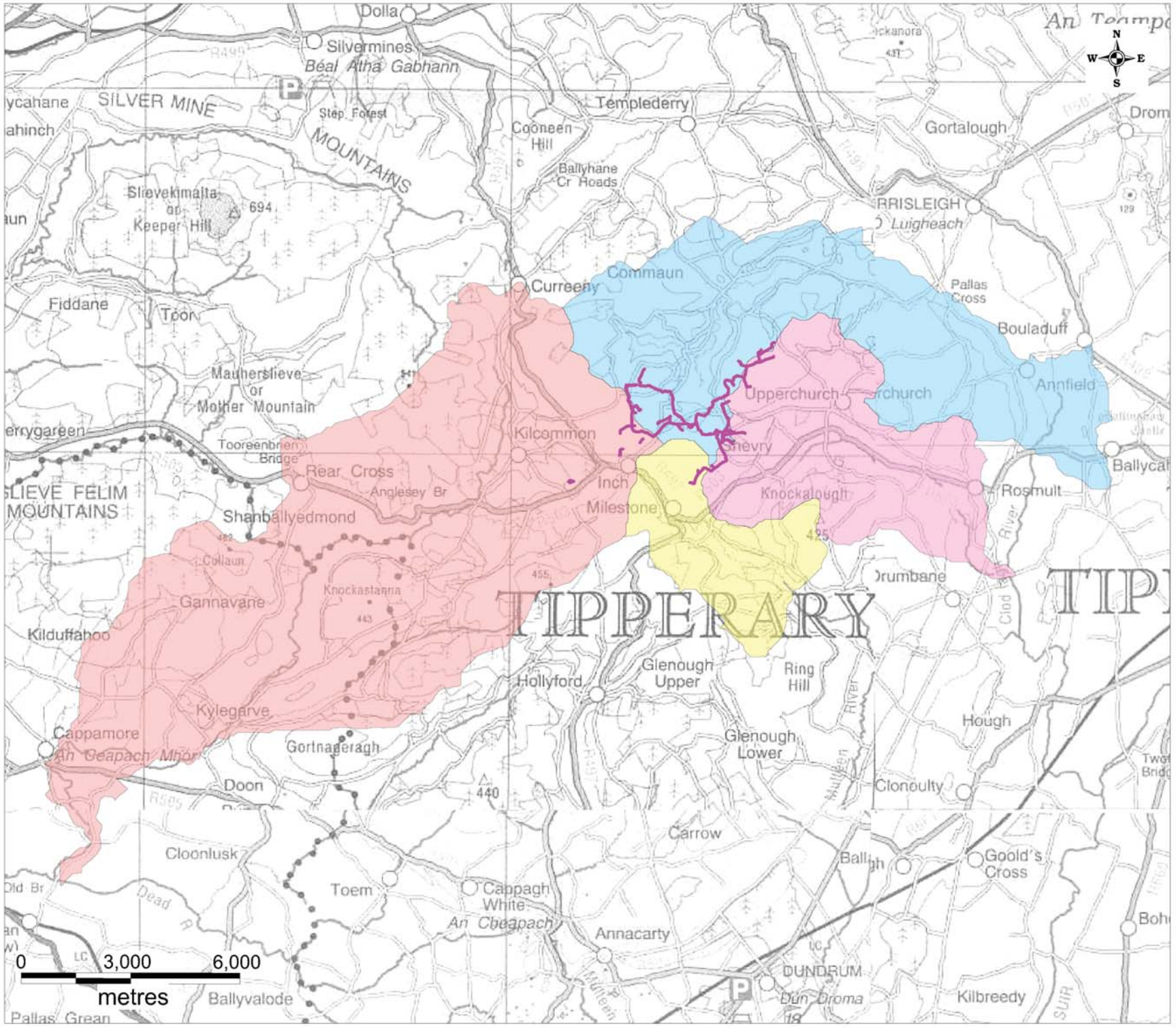
4.2.5 Surface Water Monitoring Reporting

Results of water quality monitoring shall assist in determining requirements for improvements in drainage and pollution prevention measures implemented on site.

It will be the responsibility of the Environmental Clerk of Works to present the ongoing results of water quality and weather monitoring to the Project Team at regular site meetings. There will also be regular meetings between the Environmental Clerk of Works and the Construction Manager which will include a look ahead for upcoming works and any environmental management required to facilitate ongoing construction works.

Reports on water quality will consider all field monitoring and results of laboratory analysis completed that period. Reports will describe how the results compare with baseline data as well as previous reports on water quality. The reports will also describe whether any deterioration or improvement in water quality has been observed, whether any effects are attributable to construction activities and what remedial measures or corrective actions have been implemented or are required going forward. The reports will be made available to Tipperary County Council on request.

5. FIGURES



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Client: Ecopower Development Ltd.

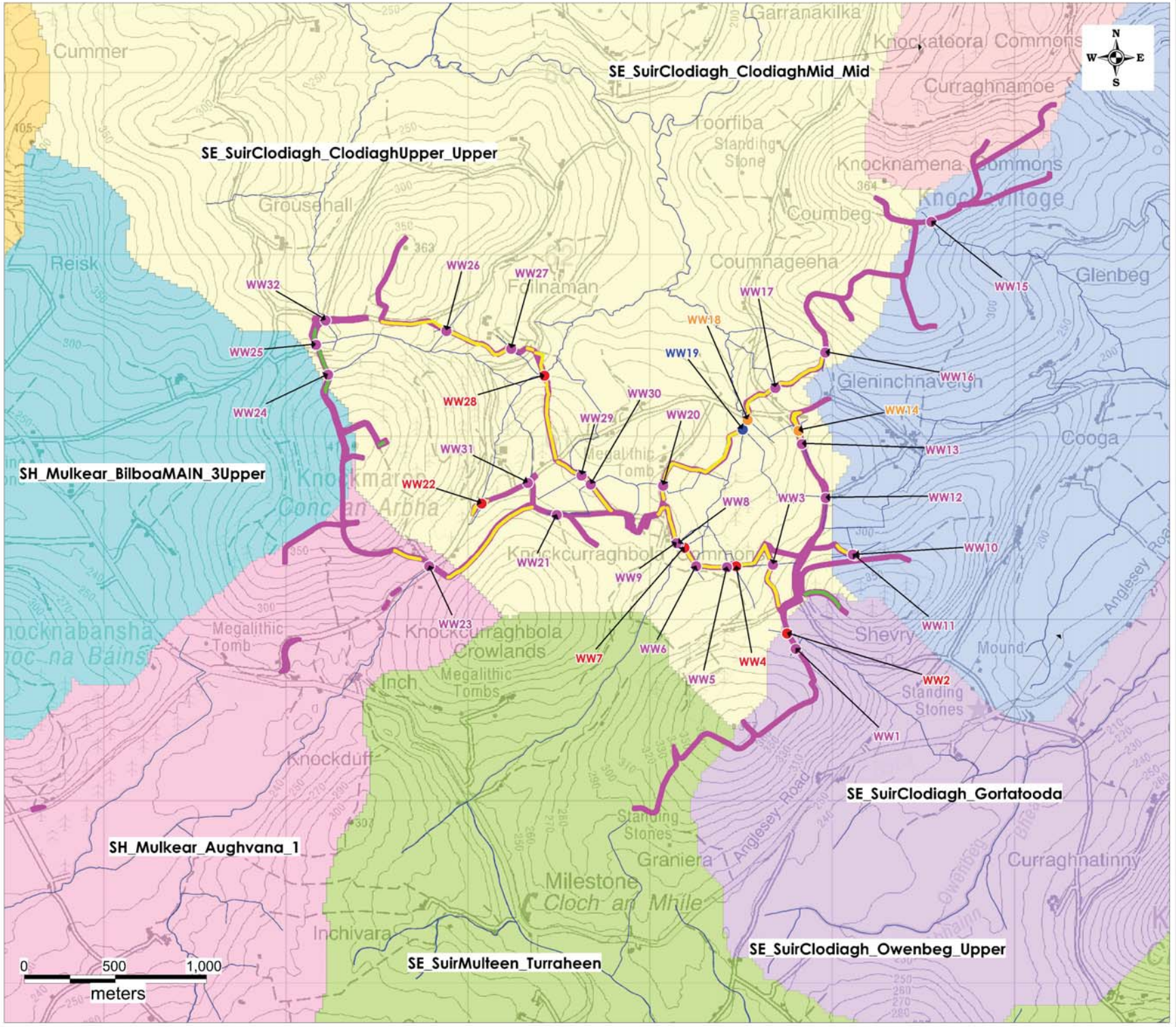
Job: UWF Related Works

Title: Local Hydrology Map

Figure No: Figure SWMP 1

Drawing No: P1299-2-0318-F-SWMP-1-A3-0A

Sheet Size: A3	Project No: P1299-2
Scale: 1:100,000	Drawn By: GD
Date: 27/03/2018	Checked By: MG



Legend

- UWF Related Works Construction Works Boundary
- Permanent Access Roads
- Temporary Access Roads
- Watercourse

Watercourse Crossing Class Type

- Class 1_EPA Blueline
- Class 2_EPA Blueline Equivalent
- Class 3_Sub Optimal
- Class 4_Drainage Ditch

*Note: WW - Related Works Watercourse Crossing

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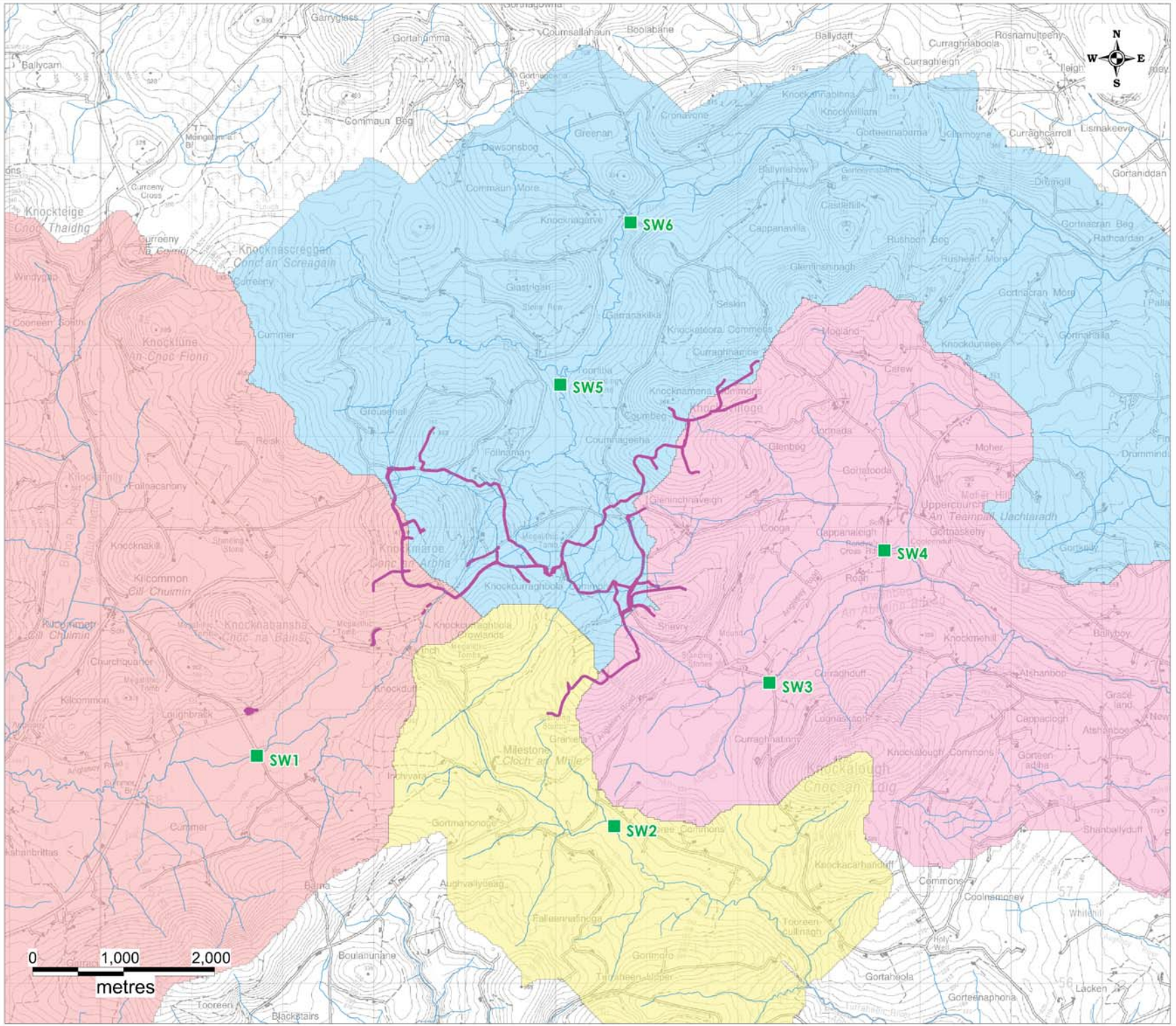
Client: Ecopower Developments Ltd.	
Job: UWF Related Works	
Title: Watercourse Crossing Location Map	
Figure No: Figure SWMP 2	
Drawing No: P1299-4-0119-FRW-11-2-2-A3-0A	
Sheet Size: A3	Project No: P1299-4
Scale: 1:20,000	Drawn By: GD
Date: 29/01/2019	Checked By: MG



Legend

- UWF Related Works Construction Works Boundary
- Proposed Surface Water Monitoring Locations
- Watercourse
- Owenbeg River
- Turraheen River
- Clodiagh River Local
- Bilboa River

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Client: Ecopower Development Ltd.	
Job: UWF Related Works	
Title: Surface Water Quality Monitoring Locations Map	
Figure No: Figure SWMP 3	
Drawing No: P1299-2-0318-F-SWMP-3-A3-0A	
Sheet Size: A3	Project No: P1299-2
Scale: 1:45,000	Drawn By: GD
Date: 27/03/2018	Checked By: MG

APPENDIX I

WATER RELATED BEST PRACTICE MEASURES

BPM No.	BPM Title
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-03*	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion 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
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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

*'It is not planned to divert any watercourse for the UWF Related Works and this Best Practice Measure is included here on a precautionary basis'.

RW-BMP-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used.

Environmental Commitment

- Prevention of significant surface water quality impacts at watercourse crossings due to in-stream works.
- Prevention of significant morphological impacts at watercourse crossings due to open trench works.

Relevant Watercourse Crossing Points

The damming and over-pumping method will typically be carried out at watercourses where a permanent crossing structure is being installed or where an existing culvert is being replaced.

Relevant Watercourse Crossing Points: **WW1, WW2, WW4, WW12, WW13, WW14, WW21, WW22, WW24, WW25 AND WW31.**

The damming and over-pumping method will also be used at cable-only crossings where flows are very low at the time of the proposed crossing works.

Relevant Watercourse Crossing Points: **WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.**

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works as required.

Surface Water Quality Protection Measures

- In-stream works at Class 1 and Class 2 watercourses will only be done over a dry period during the months of July, August and September, as required by IFI for in-stream works, (Project Design Measure);
- Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10 meter vegetative buffer zone will be maintained (if present) between disturbed areas and the watercourse bank. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location works;
- Bog mats will be used underneath the excavator, inside the 10 meter vegetative buffer zone, to prevent soil erosion/rutting and potential surface water quality impacts from localized surface water runoff;
- A temporary sump will be constructed in the watercourse bed upstream of the proposed dam location if a natural pool does not already exist. The sump will be lined with clean rockfill to prevent scouring and erosion during pumping at the intake;
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed downstream of the dam at the pump outfall. This will prevent scouring and erosion of the watercourse bed at the outfall during pumping;
- Dams are to be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment;
- Watercourse bed excavation works will only commence once the stream flow is isolated from the proposed trench excavation area;
- Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat ground or within a local hollow area. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to

prevent saturated soil from flowing back into the watercourse;

- Any pumped water from trench dewatering will be discharged onto a well vegetated, flat, dry area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag (i.e. silt bag) (Project Design Measure). Silt fencing will also be placed downslope of the outfall;
- If there is no suitable area for discharge onto ground, temporary settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Sediment laden water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the watercourse, thus preventing potential water quality impacts;
- If concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream work, the watercourse crossing will be restored to its original configuration and stabilized to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and watercourse sediments will be kept to the minimum required for the cable laying process to avoid any unnecessary impact on the watercourse morphology;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refueling allowed within 100m of the watercourse crossing (Project Design Measure);
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (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.

RW-BMP-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used.

Environmental Commitment

- Prevention of significant surface water quality impacts during watercourse crossing works in-stream works.
- Prevention of significant morphological impacts at watercourse crossings due to in-stream works.

Relevant Watercourse Crossing Points

The flume/pipe watercourse crossing method will typically be used where a temporary watercourse crossing structure is proposed.

Relevant Watercourse Crossing Points: **WW5, WW7, WW8, WW16 and WW27**

The flume/pipe watercourse crossing method will also be used at cable-only crossings where flows are too large to be managed by the dam and over pump method at the time of the proposed crossing works.

Relevant Watercourse Crossing Points: **WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.**

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- In-stream works at Class 1 and Class 2 watercourses will only be done over a dry period during the months of July, August and September, as required by IFI for in-stream works, (Project Design Measure);
- Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10 metre vegetative buffer zone will be maintained between disturbed areas and the watercourse. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location works;
- Bog mats will be used underneath the excavator inside the 10 metre vegetative buffer zone to prevent soil erosion/rutting and potential water quality impacts from localised surface water runoff;
- A pipe/flume with sufficient capacity/size to accommodate flow in the stream will then be placed in the watercourse without disturbance of the watercourse bed;
- The pipe within the watercourse will have impervious dams placed on both the upstream and downstream ends to prevent flow within the channel along the proposed trench location (the upstream dam will be placed first);
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed downstream of the pipe/flume outfall. This will prevent scouring and erosion of the watercourse bed at the outfall;
- Dams are to be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment;
- Only once the watercourse flow is isolated from the excavation area, will the watercourse bed excavation works be allowed to commence (Project Design Measure);
- Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat

ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;

- Sediment laden water from trench dewatering will be discharged onto a well vegetated, flat, dry area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag. Silt fencing will be placed downslope of the outfall;
- If there is no suitable area for discharge onto ground, temporary settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Sediment laden water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
- Once the lean mix concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream work, the stream crossing will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required;
- If the watercourse crossing is to be used as a temporary crossing for construction machinery, double silt fencing and berms will be placed at the crossing to prevent sediment/runoff from the access road surface entering the watercourse;
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and watercourse sediments will be kept to the minimum required for the cable laying process to avoid unnecessary impact on the watercourse morphology;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refuelling allowed within 100m of the watercourse crossing;
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (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.

RW-BMP-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used.

Environmental Commitment

Prevention of significant surface water quality impacts at stream crossings due to in-stream works.

(It is not planned to divert any watercourse for the UWF Related Works and this Best Practice Measure is included here on a precautionary basis)

Work Sections/Locations

No planned location, BPM included on a precautionary basis

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- As the watercourse is Class 1, the in-stream works will only be done over a dry period in the months of July, August or September, as required by IFI for in-stream works (Project Design Measure);
- Firstly, the works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10 meter vegetative buffer zone will be maintained between disturbed areas and the watercourse. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location;
- Bog mats will be used underneath the excavator inside the 10 meter vegetative buffer zone to prevent soil erosion and potential water quality impacts from localised surface water runoff;
- Temporary storage of excavated overburden from the diversion channel will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
- The watercourse dam (in the stream to be diverted) will be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment (the dam will be installed once the diversion channel is in place);
- The banks and bottom of the diversion channel will be lined with impermeable geotextile to prevent erosion and surface water quality impacts. A layer of clean course gravel will be placed over the geotextile on the bed of the channel to keep it in place;
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed and opposing bank of the receiving watercourse downstream of the diversion channel. This will prevent scouring and erosion of the watercourse bed and bank at the outfall during diversion;
- Watercourse bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area;
- Temporary storage of excavated material from the crossing trench will be undertaken separately to the material from the diversion channel. All storage areas will be outside the 10m buffer zone. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing

back into the watercourse;

- Sediment laden water from trench dewatering will be discharged onto a well vegetated, dry, flat area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing;
- If there is no suitable area for discharge onto ground, settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Any water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
- Once the lean mix concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream works, the stream crossing and will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);
- The diversion channel will be backfilled and reinstated to its original level and rock armour will be placed at the stream banks where the inflow and outflow of the diversion channel previously existed;
- The ground surface along the reinstated diversion channel will be re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing on either side of the stream buffer will be left in place and maintained until the disturbed ground has re-vegetated;
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and stream sediments will be restricted to the minimum required for the cable laying process to avoid unnecessary impact on the stream morphology;
- There will be no batching or storage of cement allowed at the stream crossing;
- There will be no refuelling allowed within 100m of the stream crossing;
- All plant will be checked for purpose of use prior to mobilisation at the stream crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (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.

RW-BMP-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert.

Environmental Commitment

Prevention of significant surface water quality impacts from sediment input during widening or replacing an existing culvert crossing. Typically this work will be undertaken where there is a requirement to widen an existing road at a watercourse crossing or where the existing culvert is inadequate for crossing with construction traffic.

Work Sections/Locations

Existing culverts will be replaced at the following locations:

Relevant Watercourse Crossing Points: **WW12, WW21 and WW31**

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- Replacing / extending of culverts in watercourses of ecological importance (Class 1 and Class 2 type watercourses) will only be done over a dry period between July and September (as required by IFI);
- When the watercourse is Class 1 or Class 2, and there is a requirement to disturb either the bed or bank, the watercourse will be dammed upstream and pumped prior to work commencing (refer to RW-BPM-01);
- Where culverts in drains (Class 4) or low ecological importance (Class 3) are being replaced, temporary check dams / silt fencing arrangements will be placed within the drain downstream of the crossing location. No damming or over pumping will be necessary unless flows are significant;
- If a cable is being placed beneath the culvert and dewatering of the excavation is required, please refer to RW-BPM-01 or RW-BPM-02 for water management / water quality protection measures;
- Where culvert widening has been completed, only clean, well-sorted fill or hardcore will be used to widen the road at the crossing location. Poorly sorted material will not be used as it would be a potential source of fine sediment;
- Before the road surface layer is put in place, a layer of geotextile will be placed over the fill to prevent wash down of fines into the fill and potentially into the watercourse;
- A temporary berm (i.e. sandbags and/or rectangular straw bales) will placed along the edge of the access road to prevent loose material being dislodged or washed into the watercourse;
- Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;
- If high levels of silt or other contamination is noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface watercourses;
- All disturbed ground will be re-seeded at the soonest opportunity to prevent erosion;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refuelling allowed within 100m of the watercourse crossing; and,
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.

References

- IFI (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.

RW-BMP-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse.

Environmental Commitment

Prevention of significant surface water quality impacts from sediment input when excavation works (cable trenching, temporary, permanent access construction, haul route works etc.) are being carried out within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA blueline equivalent).

Work Sections/Locations

- Trench excavations and access road construction (temporary or permanent) will be required within 50m of a watercourse at all Class 1 and Class 2 watercourse crossing locations along the Related Works
- Trench excavations and access road construction will be within 50m of a watercourse at UWF Related Works sections **HW11 and HW12**.

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- Where works are proposed within the 50m watercourse buffer zone, additional mitigation will be employed to ensure the watercourse is protected;
- Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted;
- Where the cable trench / access road / works area is running adjacent and parallel to a watercourse (all watercourse types, Class 1 to Class 4), a minimum 5m buffer will be maintained between the works area and the watercourse edge;
- Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m watercourse buffer;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;
- Additional silt fencing or temporary straw bales (rectangular bales, pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards a local watercourse;
- Where the cable trench / access road route slopes down perpendicular towards a watercourse (*i.e.* base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the works corridor to dissipate surface water runoff from the works area and onto adjacent vegetated ground. Additional silt fencing will be put at the outfall location of the bunds / swales;
- Temporary check dams / silt fencing arrangements will be placed in any local artificial watercourses/drains (Class 4 and Class 5 watercourses) within 30m of the works corridor (this will also include existing road drains along the haul route works);
- The check dams / silt fencing arrangements will be placed every 10m;
- Bog mats will be used in wet / boggy areas zone to prevent ground rutting and soil erosion which could lead to potential water quality impacts. All ground rutted by vehicles / machinery will be levelled or backfilled to prevent their progression as preferential pathways for surface water runoff;
- If high levels of silt or other contaminants are noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of

entrainment of suspended sediment in surface water runoff and transport via this pathway to surface watercourses;

- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion;
- All temporary surface water control / protection measures such as silt fencing and check dams will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken;
- Where the cable trench route runs downslope for long distances (>50m) towards a watercourse, regular spaced impermeable bunds will be placed within the trench backfill to prevent the trench acting as a drain towards the stream thus preventing potential water quality impacts from surface water drainage within the trench;
- There will be no refuelling allowed within 100m of a watercourse; and,
- All plant will be checked for purpose of use prior to mobilisation.

References

- IFI (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.

RW-BMP-06	Surface Water Quality Protection Measures During Tree Felling Works.

Environmental Commitment

Prevention of significant surface water quality impacts from sediment/nutrient input during coniferous tree felling.

Work Sections/Locations

- Coniferous tree block felling will be required at the following locations: RWR1/SW16 and SW24

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Supervise tree felling works and drainage works.

Pre-felling surveys

- Inspection of main drainage ditches and outfalls will be completed during wet periods, and well in advance of the proposed felling works;
- Another full inspection of the proposed felling area will be completed by the Construction Manager one day in advance of the proposed felling works;
- Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines;
- Inspection of all areas reported as having unusual ground conditions; and,
- Pre-felling surface water sampling will be undertaken at the main watercourse downstream of the works area (sampling will be completed during a wet period).

Protection of watercourses during felling works

- Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance;
- Checking and maintenance of roads and culverts will be undertaken by the Construction Manager throughout the felling operation;
- No tracking of vehicles through watercourses will occur, as vehicles will use road infrastructure and watercourse crossing points;
- Drains which flow from the areas to be felled will have temporary silt traps installed;
- Where felling is to be completed inside the 10 – 25m aquatic buffer zone along a watercourse, double silt fencing will be arranged downslope of the proposed works area;
- Brash mats or bog mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding will occur;
- Timber will be stacked in dry areas away from surface water buffer zones. Temporary rectangular straw bales to be emplaced on the down-gradient side of timber processing areas;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff;
- Following tree felling all drains will be inspected to ensure that they are functioning and silt traps will remain in place until all disturbed ground has stabilised;
- Extraction tracks near drains will be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining vegetated ground. Silt fencing will be installed downslope of any diversion channels where ground has been broken or disturbed;
- All accumulated silt will be removed from existing drains, culverts and silt traps. This removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall.

Post-felling surveys
• Post-felling surface water sampling will be undertaken at the main watercourse downstream of the works area (sampling will be completed during a wet period).
References
• Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh; • Coillte (2009): Forest Operations & Water Protection Guidelines; • Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures; and, • Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford.

RW-BMP-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds.

Environmental Commitment

Prevention of significant surface water and groundwater quality impacts during use of Cement Based Compounds.

Work Sections/Locations

- Internal Windfarm Cabling – public road crossing locations and
- Telecom Relay Pole - foundations

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Ensure best practice e storage and use of Cement Based Compounds.

Related Works

- No wet-cement products will be used in the 110kV grid connection trench (Project Design Measure);
- A dry granular cement mix will be used in the cable trench, and, pre-cast structures / pipes will be used for new temporary or permanent crossings;
- No washing out of any plant or equipment used in concrete transport or concreting operations will be allowed along the route;
- Any spills no matter how small or material or overburden contaminated with cement mix will be moved off-site for disposal at a licensed premises;
- Outfalls or natural pathways *(i.e.* preferential flow paths) from the trench towards any local drain or watercourse will be prevented. Outfalls or natural pathways will be temporarily blocked using sand bags and geotextile until the cement mix has set; and,
- At watercourse crossing locations, a layer of fine sand (5 – 10cm) will be placed over the cement mix within the trench prior to backfilling. This will prevent release of cement into the watercourse when flow is restored.

Measures at the Mono-Pole Mast

- No batching of wet-cement products will occur on site (Project Design Measure).
- Ready-mixed supply of wet concrete products and pre-cast products will be used for watercrossing structures;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete will be delivered on site, only the chute will need to be cleaned, using the smallest volume of water practicable. Cement wash water will be collected in a sealed, temporary lagoon which will be placed at least 50m from a watercourse;
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be tanked and removed from the site to a suitable, non-polluting, discharge location;
- Weather forecasting will be used to plan dry days for pouring concrete;
- The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.

Monitoring Measure

- Regular pH monitoring of the construction drainage water will be completed. When there is an increase of pH above the natural baseline in the local stream, pH adjustment will be undertaken prior to the release of the surface water drainage.

References

- IFI (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.
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006)
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors.

RW-BMP-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals.

Environmental Commitment

Prevention of significant water quality impacts during storage and handling of fuels, oils and chemicals.

Work Sections/Locations

- Construction works area boundary

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Ensure best practice use and storage of fuels, oils and chemicals on-site.

Manage of on-site refueling

- On site re-fuelling of immobile machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located;
- The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages;
- The fuel bowser will be parked on a level area in the construction compound when not in use and only designated, trained and competent operatives will be authorised to refuel plant on site;
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- All generators and suction pumps used at watercourse crossing locations will have a double skinned fuel tank or be placed on a drip tray; and,
- There will be no storage of fuel or refuelling or mobile plant permitted within 100m of a watercourse.

Storing fuel properly

- Fuels stored on site will be minimised. Storage areas, which will be located at the temporary compounds, will be bunded appropriately for the fuel storage volume for the time period of the construction (Project Design Measure).

Monitoring Measure

- Regular pH monitoring of the construction drainage water will be completed. When there is an increase of pH above the natural baseline in the local stream, pH adjustment will be undertaken prior to the release of the surface water drainage.

Avoid leakage from plant and tools

- The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.

Contingency for spillages

- An emergency plan for the construction phase to deal with accidental spillages is contained within Environmental Management Plan (Section 6).
- Spill kits will be available to deal with any accidental spillage in and outside the refuelling area; and,
- Any spills no matter how small or material or overburden contaminated with fuel/oil will be moved off-site for disposal at a licensed premise.

References

- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006).
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.
- EMP for UWF Related Works, Section 6: Environmental Emergency Procedure for Oil/Fuel Spillage

RW-BMP-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk

Environmental Commitment

Prevention of flooding at watercourse crossings due to undersized culverts / bridges.

Work Sections/Locations

Relevant Watercourse Crossing Points: **WW1, WW13, WW15, WW24 and WW25** (Class 4 water crossings), also **WW14** (Class 3 water crossings), also **WW2, WW4 and WW22** (Class 2 water crossings).

Responsibility of	Role/Duty
Construction Manager	• Ensure appropriate culvert/bridge design. • Supervise the construction works.

Surface Water Quality Protection Measures

- All permanent culverts/bridges will be sized to cope with a minimum 100-year flood event (Project Design Measure);
- A freeboard of 300mm, or as required by OPW, will be kept below the crossing structure during a 100-year flood event;
- At a minimum, all new pipe culverts will be 900mm in diameter regardless of the anticipated flood flow (Project Design Measure) (*i.e.* minimum 900mm culvert will be used in Class 3/Class 4 watercourses regardless of flows);
- New and replaced permanent crossing structures will be construction in accordance with the Office of Public Works (OPW) guidelines Construction, Replacement or Alteration of Bridges and Culverts (2013),
- As agreed with OPW (telephone consultation, February 2018) will be subject to a Section 50 application to OPW following the grant of planning permission.

References

- The Planning System and Flood Risk Management Guidelines (DoEHLG, 2009).
- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

RW-BMP-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas.

Environmental Commitment

Prevention of significant surface water quality impacts during Temporary Storage of Overburden.

Work Sections/Locations

Temporary overburden storage will be located at the following locations:

Internal Windfarm Cabling, construction works area boundary

Haul Route Works locations

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works

Surface Water Quality Protection Measures

- No temporary overburden storage areas will be permitted within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA unmapped blueline equivalent) watercourse (**Project Design Measure**);
- Sloping ground and areas with wet ground conditions / ponding will be avoided;
- Where possible, the temporary overburden storage area will be located on vegetated ground as the existing vegetation will act as an effective buffer against any sediment in runoff from the storage area;
- The overburden mound will not be compacted, nor will the surface of the mound be smoothed or battered back as rough surfaces on overburden mounds increase infiltration and reduce surface water runoff and erosion;
- A perimeter of double silt fencing will be placed around the temporary storage area. Silt fencing will be checked on a daily basis and replaced when necessary;
- Temporary check dams and silt fencing arrangements will be placed in local Class 4 watercourses (Drains) and Class 3 watercourses (Marginal Watercourses) if they exists within 20m of the storage area;
- Where the temporary overburden storages areas are located in forestry, temporary blocking of mound drains/rills will be undertaken downslope of the storage area. All existing roadside drains will have temporary check dams installed;
- During periods of heavy rainfall a sheet of polyethene or a geotextile will be used to cover the overburden to prevent erosion; and,
- All temporary overburden storages areas will be checked / monitored on a daily basis until stabilised to ensure no drainage issues of surface water quality impacts are occurring.

References

- IFI (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; and,
- CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.

RW-BMP-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas.

Environmental Commitment

Prevention of significant surface water quality impacts during Permanent Storage of Overburden.

Work Sections/Locations

Permanent overburden storage will be located at the following locations:

- Telecom Relay Pole

- Realigned Windfarm Roads

Responsibility of	Role/Duty
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- No permanent overburden storage areas will be permitted within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA unmapped blueline equivalent) watercourse (Project Design Measure);
- Sloping ground and areas with wet ground conditions will be avoided;
- If possible, within grassland, the permanent overburden storage area will be located on vegetated ground as the existing vegetation will act as an effective buffer against any sediment in runoff from the storage area until it has stabilised by vegetation;
- Within grassland, a perimeter of double silt fencing or a sand bag/geotextile berm will be placed around the permanent storage area until the mound has stabilised by vegetation;
- Where the permanent overburden storages areas are located in forestry, temporary blocking of mound drains/rills will be undertaken downslope of the storage area until the mound has stabilised by vegetation;
- At permanent storage areas along proposed permanent access roads or existing roads (*i.e.* forestry tracks and farm tracks) silt trap / silt fence arrangements will be placed within the proposed / existing road drainage and left in place until the mound has stabilised by vegetation;
- The overburden mound will be seeded at the soonest opportunity to prevent erosion; and,
- All permanent overburden storages areas will be checked / monitored on a weekly basis until stabilised to ensure no drainage issues of surface water quality impacts are occurring.

References

- IFI (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; and,
- CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.

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UWF RELATED WORKS

VOLUME D

Revised ENVIRONMENTAL MANAGEMENT PLAN

Tab 5

Invasive Species Management Plan

ECOPOWER

Revised January 2019

INVASIVE SPECIES MANAGEMENT PLAN

UWF RELATED WORKS, COUNTYTIPPERARY

Revised January 2019

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Client: **Ecopower Ltd**

Document Title: Invasive Species Management Plan

Project Location: Co. Tipperary

Document Issue:

Revision	Status	Issue Date	Author	Approved by
V1.0	Final	12/01/18	HW	FG/CC

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Table of Contents

ACRONYMS

EA	Environment Agency (UK)
EPA	Environmental Protection Agency (Ireland)
HK	Himalayan knotweed (*Persicaria wallichii*)
JKW	Japanese knotweed (*Fallopia japonica*)
NPWS	National Parks and Wildlife Service
RH	Rhododendron (*Rhododendron ponticum*)

EXECUTIVE SUMMARY

This report has been prepared by Mr. Howard Williams, Principal Ecologist with Inis Environmental Consultants Ltd. Dr. Frances Giaquinto, ecologist, PhD botanist and non-native invasive plant species specialist completed the site assessments and compiled the scientific information relating to each infestation.

This report documents a site assessment of one locations where Japanese knotweed infestation was recorded by Inis field ecologists during habitat assessments as part of their work on UWF Related Works.

The purpose of the site assessment was to estimate the severity of the infestation and, where appropriate, to make recommendations on the most appropriate measures to contain and make safe the infestation.

The site assessments on the Whole UWF Project were conducted by Dr. Giaquinto on the 24th September 2017 and 1st October 2017. Physical site, ecological and invasive species data were gathered by Dr. Giaquinto on those dates. On the 11th October 2017, Mr. Howard Williams and Mr. Peter O'Connor (GIS Specialist) from Inis Environmental Consultants Ltd visited the location of the infestation relevant to UWF Related Works – Site A - to measure the exact extent of the infestation to allow for accurate GIS mapping of the infestation.

The infestation is not within 7 metres of the works and as such poses no risk of spreading through mechanical means. Notwithstanding this point, biosecurity measures are proposed throughout the construction phase. The infestation does not need to be removed or destroyed to enable successful completion of the project.

It is important to note that no bio security measures guarantee containment, and the effectiveness of any measure will be largely dependent on the standards with which it is executed, combined with skilled monitoring. As such, an invasive species specialist will monitor the infestation location during all critical stages of construction works.

INTRODUCTION

During fieldwork on the Whole UWF Project, Inis field ecologists identified one invasive plant infestation location (Japanese knotweed) relevant to UWF Related Works – Site A.

Invasive non-native species are any animal or plant introduced (deliberately or accidently) by human activity to an area in which they do not naturally occur. Invasive non-native species (INNS), sometimes referred to as 'invasive alien species', are those non-native species that have the ability to spread rapidly and become dominant in an area or ecosystem, causing adverse ecological, environmental and economic impacts. Examples of the negative effects caused by invasive non-native species include economic cost, structural damage, environmental degradation, aesthetic degradation, biodiversity loss, loss of land function and access restrictions.

Inis appointed Dr. Frances Giaquinto, an invasive plant specialist, to visit the invasive plant infestation location and complete an assessment of the infestation. The site assessment by Dr. Giaquinto confirmed the presence of Japanese knotweed (*Fallopia japonica*) at one location.

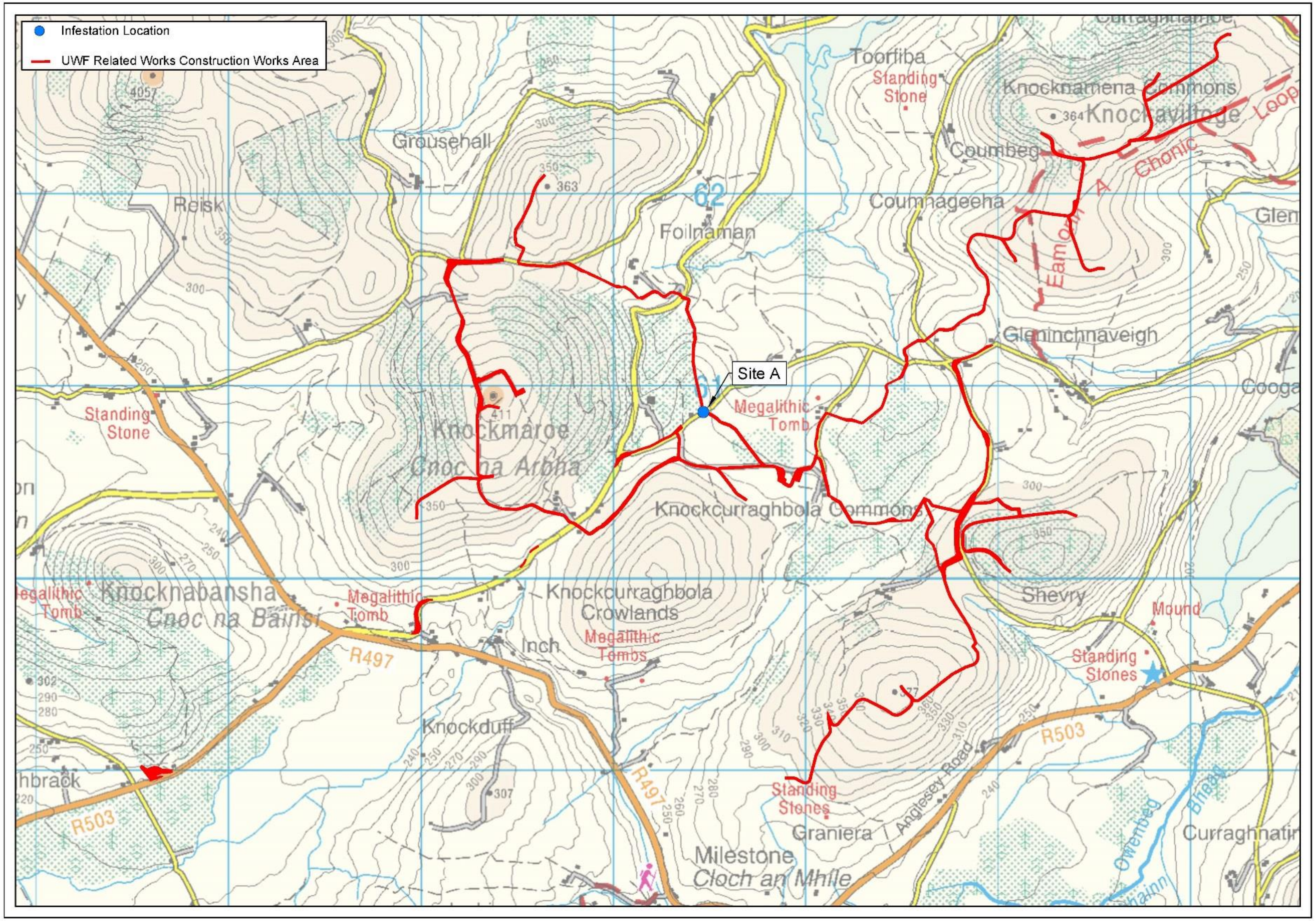
This report provides a description of the infestation with particular reference to notable site and infestation features. Recommended containment measures are presented, which are:

- most appropriate for the location;
- most likely to be effective;
- maintains compliance with EU and national legislation and guidelines pertaining to the control of invasive non-native plant species

DATA COLLECTED

At the location the following data (See Appendix R3) were gathered to assess the extent and severity of the infestation:

- square meterage;
- height;
- flowering;
- mean size and number of basal crowns;
- mean number of canes per stand;
- mean thickness of canes;
- overall health and vigour;
- evidence of physical disturbance;
- and evidence of previous chemical treatment or other attempts at control or eradication.


Infestation Location
UWF Related Works Construction Works Area
Site A
Grousehall
Reisk
Foilnaman
Toorfiba
Standing Stone
Knocknamena Commons
Coumbeg
Coumnageeha
Gleninchnaveigh
Knockmaroe
Cnoc na Arbha
Megalithic Tomb
Knockcurraghbola Commons
Knockcurraghbola Crowlands
Megalithic Tombs
Knocknabansha
Cnoc na Bainsi
Inch
Knockduff
Shevry
Mound
Standing Stones
Graniera
Milestone
Cloch an Mhíle
Anglesey Road
Curraghnatin
Glen
R497
R503

RESULTS

INFESTATION NUMBER	**Site A**
INFESTATION TYPE	Japanese knotweed (*Fallopia japonica*)
INFESTATION LOCATION	594434 E 660905 N (ITM)

DESCRIPTION

A stand of young, actively growing Japanese knotweed was recorded by a farm gate (See Plate 6). It was 2 m high, with no more than 15 canes arising from a single basal crown. On the other side of the gate, the infestation extended for a further 2m beside the hedgerow bordering the road way. The infestation is 7 m from the proposed construction area and, as such, poses a low risk to construction activities.

RECOMMENDATION

1. Implement appropriate biosecurity measures as advised in Appendix R2.
2. The infestation's outer edge is 7 metres from the proposed construction access route and, as such, poses no risk.
3. Herras fencing or similar should be erected around the infestation with a 3 metre buffer zone to ensure the ground beneath and around the infestation is left undisturbed.

LOCATION MAP- SITE 6

Plate 6 Location of Infestation: Site A

APPENDIX R1
ILLUSTRATIVE PLATE

1		**Site A** Young, isolated Japanese knotweed infestation by farm gate.

APPENDIX R2
BIOSECURITY MEASURES

Biosecurity measures

The following biosecurity measures will be applied at each location, where appropriate:

1. A full time invasive species specialist will be appointed to monitor key stages in construction, particularly when soil excavation begins near infested areas. The invasive species specialist will have a 'stop works' authority;
2. The full time invasive species specialist will design and provide a toolbox talk, to all workers, on invasive plant species on the project;
3. The invasive species specialist will assist in designing all access/transit points that are proximal to any infestation and, where possible, will cordon off all infested areas to include a buffer zone (≤7 m) to prevent unauthorized access;
4. The Contractor, as PSCS, will be responsible for the management of all construction onsite and as such will be responsible for the provision to operatives of on-site invasive species training which will include details on dispersal prevention.

APPENDIX R3
INFESTATION INFORMATION

Site #	Spp.	Extent_m2	dis_extent	Ave_ht_(m)	BC	BC_no/m2	BC-Sz	Cane_d(cm)	Cane_ave_no	Dispersed	Risk_cause	soil_type	Prev_treat
1	HK	104	28+	1	n/a	n/a	n/a	n/a	n/a	yes	LM, grazing	infill, banked	cutting, herbicide
2	JKW	20	no	3	yes, but immature	2	≤40cm	3cm	24	no	prox to forestry track	woodland	no
3	JKW	≥1000	massive	3m	mature	4	≤40cm	3cm	varies	yes	prox to track, LM	farmland	cutting
4	JKW	20	no	2.5	mature	2	≤40cm	3cm	18	no	prox to forestry track	woodland	no
5	JKW	≥1000	massive	varies	mature in hedgerow	4		4cm	22	yes	LM, grazing	farmland	cutting
6	JKW	10	no	1.5	no	n/a	n/a	2cm	5	beginning	natural dispersal	farmland	no
7	JKW	≥500	no	3	v few	1	≤30	1-3cm	varies	yes	natural dispersal	road verge	cutting

LEGEND

Extent_m^2	Extent of infestation, square metres
dis_extent	Extent of dispersed infestation
Ave_ht_(m)	Average height of canes (m)
BC	Basal crowns: presence/absence
BC_no/m^2	Ave. no. basal crowns per 1 m^2
BC-Sz	Ave. diameter basal crowns (av. of 20)
Cane_d(cm)	Cane diameter (cm). average of 20, different stands
Cane_ave,no	Ave. no. canes
Dispersed	Extent of dispersal of infestation due to disturbance.
Risk_cause	LM – land management practices

Please note: Basal crowns (size and diameter) and diameter of canes can be used to estimate age / maturity. In a dense infestation, evidence of basal crowns, cane diameter and height can give an indication of previous treatment (cutting back, herbicide treatment).

UWF RELATED WORKS

VOLUME D
Revised ENVIRONMENTAL MANAGEMENT PLAN

Tab 6
Waste Management Plan

ECOPOWER

Revised Jaunary 2019

Table of Contents

LIST OF FIGURES– included at the end of this Plan

LIST OF TABLES

1 Waste Management Plan

1.1 Introduction

This Waste Management Plan (WMP) will provide the basis for the preparation of a final WMP, which will include any relevant planning conditions. The appointed Contractor will draw up the final WMP and will be responsible for carrying out and managing the construction wastes in accordance with the WMP.

1.1.1 Objective of the Waste Management Plan

This Waste Management Plan (WMP) will be implemented to minimise waste, promote a practice of reduce, reuse and recycle where possible and ultimately to ensure the correct handling and disposal of construction waste streams in accordance with the Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Department of the Environment, July 2006.
Construction wastes will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts and new Southern Waste Management Plan.

1.1.2 Scope of WMP

This WMP **concentrates on the construction stage** of the UWF Related Works which is the critical phase in the context of waste management.

1.1.3 Responsibilities

The responsibility of construction waste management will be placed with the Project Supervisor (Construction Stage) (PSCS) so that all reuse, recycling, wastage and necessary disposal can be monitored as close to the source as possible.

The PSCS will be assigned the authority to instruct all site personnel to comply with the specific provisions of this Plan. The PSCS will work closely with the Appointed Contractor to ensure that the Plan is implemented and updated when necessary in order to ensure that a waste management hierarchy of prevent, reduce, reuse, recycle and responsibility is implemented throughout the construction stage of the project.

An Environmental Clerk of Works will be employed by the Project Promoter to monitor the implementation of the WMP throughout the construction stage of the UWF Related Works.

All site personnel will have a responsibility to keep the construction works areas tidy, not to litter and to bring wastes back to Upperchurch Windfarm Site Compound on a daily basis for storage.

1.2 Overview of UWF Related Works

UWF Related Works, comprises the following elements:

- Internal Windfarm Cabling
- Realigned Windfarm Roads
- Haul Route Roads
- Telecom Relay Pole
- RW Ancillary Works

See Figure RW WMP 1: Location of the UWF Related Works on OSI Discovery Mapping, which is included at the end of this plan.

1.2.1 Purpose of the UWF Related Works

The purpose of the UWF Related Works are as follows:

- Internal Windfarm Cabling: to connect the Consented UWF Turbines to the Consented UWF Substation.
- Realigned Windfarm Roads: to realign two lengths of Consented UWF Roads and to provide access to a new Telecom Relay Pole.
- Haul Route Works: to facilitate the haulage of turbine components to the Upperchurch Windfarm site.
- Telecom Relay Pole: to be erected in order to carry telecoms relay equipment, which will mitigate communication links impacts from operational Consented UWF Turbines on the communication signals between Foilnaman Mast and Laghtseefin Mast. The Telecom Relay Pole will fulfil Condition No. 18 of the planning conditions associated with the Upperchurch Windfarm.
- RW Ancillary Works: will facilitate the construction of the UWF Related Works.

Note: the Consented UWF Turbines, Consented UWF Roads and the Consented UWF Substation refer to components of Upperchurch Windfarm (UWF). UWF has already received planning consent, but is not yet constructed.

1.2.2 Description of the Characteristics of the UWF Related Works

The characteristics of UWF Related Works are described in more detail in the EIA Report, which accompanies the 2018 planning application to Tipperary County Council for the UWF Related Works
- see Chapter 5: Description of the Development (UWF Related Works), in Volume C2 Main EIA Report.

The construction stage, is described at Section 5.3.1, construction materials which will be brought onto the site are described at Section 5.3.1.8 of Chapter 5: Description of the Development (UWF Related Works).

1.3 Construction Waste & Material Arising

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

In the course of the construction of the UWF Related Works, the following construction wastes/ excavated materials will arise:

Table 1: Construction Wastes/Excavated Materials

Construction Waste Material	European Waste Code
Concrete	17 01 01
Wood pallets, timber shuttering, timber profiles (cables trench)	17 02 01
Component packaging - paper/plastic/timber profiles	17 02 01 / 17 02 03/ 20 01 01
Hazardous Materials – oil contaminated material, oily rags, construction vehicle fuel and oil	17 03 02
Steel foundation rebar	17 04 05
Canteen Waste – waste water from washing and toilet facilities	20 03 01
Excavated Materials arising - Soil & Stone Note: All **excavated soil and rocks** will be reused on site to form permanent berms, for reinstatement of construction works areas, and as such will not constitute waste but rather 'material arising' on the UWF Related Works site.	17 05 04

1.4 Management of construction waste/materials

The waste materials will be moved off site by a specialist waste service contractor, who will possess the requisite authorisations for the collection and movement of waste, and who will bring the material to a facility which holds the requisite license for the specific waste. The Arlo Group have been identified as the appropriate licensed operator in the area.

All waste will be segregated and securely stored in skips and receptacles, which will be covered to protect the contents from the weather at Upperchurch Windfarm Site Compound. The licensed operator, will collect and transfer the skips/receptacles of both recyclable and non-recyclable wastes as they are filled. Upperchurch Windfarm Site Compound will also accommodate the temporary site offices and WC facilities and this area will be secured by fencing and manned security 24/7 to prevent unauthorised access.

1.4.1 Waste Collection – Arlo Group

The Arlo Group has been identified as the appropriate licensed operator in the area.

General waste, waste water and publc road arisings will be collected from the construction site by Arlo Group and transported to their approved licensed facilities at Thurles, County Tipperary.

All chemical wastes will be removed from site by Arlo Group and transported to either Enva Ireland Limited approved licensed facilities at Shannon, Cork, Portlaoise or Dublin or to the Rilta Environmental Ltd. approved licensed facility in Dublin.

1.4.2 Excavated materials arising

All soil and stone excavated from the development footprint area will be reused on-site to backfill the Cable Trenches, reinstate works areas and to form boundary banks, and thus waste from all excavated soil will be prevented.

During excavations, the topsoil and subsoil will be removed and if it is not used immediately, will be stored separately and protected from the weather if necessary, by geotextile. As much surface vegetation as possible will be kept intact on the topsoil layer, which will ultimately form the top layer of the reinstated areas or new boundary banks. The reinstated areas and new boundary banks will be reseeded with grass species to encourage reinstatement of the existing vegetation

1.4.3 General Building Materials – concrete, timber, steel, packaging etc

The PSCS will ensure that materials are ordered so that the quantity delivered, the timing of the delivery and the storage does not create unnecessary waste.

All individual waste streams will be identified at source, separated into recyclable and landfill waste and stored in designated skips in a designated part of Upperchurch Windfarm Site Compound. When full, the skips will be collected by authorised waste contractor, Arlo Group.

1.4.4 Canteen Wastes/WC facilities

Self-contained toilets and washing facilities, with integrated waste water storage tanks, will be provided for construction workers at Upperchurch Windfarm Site Compound. The waste water storage tanks will be emptied as needed, by the approved licensed operator, Arlo Group, and transported to the approved water treatment plant in Thurles or other appropriately licensed facility.

All toilets will be serviced on a weekly basis. A record of servicing will be kept by a licensed waste removal operator, such as Arlo Group. Servicing shall include internal cleansing, emptying and recharging with water and toilet additive and replenishing of all consumables

Regular housekeeping of the temporary canteen/WC areas will be carried out and this general waste will be stored secure from weather and vermin at Upperchurch Windfarm Site Compound, and collected regularly by the approved operator, Arlo Group

1.4.1 Hazardous materials

Appropriate storage of all hazardous wastes on-site will be undertaken. There will be a secure, covered, bunded area in a designated part of Upperchurch Windfarm Site Compound for any waste oil, oily rags and contaminated materials. Storage of any hazardous wastes produced will be kept separate from other waste materials, in order to avoid further contamination.

1.4.2 Training & Communication

During Site Induction training, personnel will be informed of the objectives of the WMP and their responsibilities under the Plan.

Copies of the Waste Management Plan (WMP) will be made available to all relevant personnel on site. Posters will be designed to reinforce the key messages within the Plan and will be displayed prominently for the benefit of site staff.

1.5 Waste Auditing

The PSCS shall arrange for full details of all arisings, movements and treatment of construction waste discards to be recorded during the construction stage of the Project.

Each consignment of construction waste taken from the site and excavated materials arising on-site will be subject to documentation, which will conform to the table below. This will ensure full traceability of the material to its final destination.

Table 2: Waste Details to be Provided

Waste Details to be Provided	
Name of Project of Origin	UWF Related Works (e.g. Upperchurch Windfarm Site Compound)
Material being Transported	e.g Canteen Waste
Quantity of Material	tonnes
Date of Material Movement	dd/mm/yyyy
Name of Carrier	e.g. Arlo Group
Destination of Material	e.g. Waste Water Treatment Plant, Thurles, Co. Tipperary
Proposed Use	e.g. treatment under EPA license before discharge to waters

Details of the inputs of materials to the construction site and the outputs of wastage arising from the Project will be recorded by the PSCS in a Waste Audit, which will identify the amount, nature and composition of the waste generated on the site. The Waste Audit will examine the manner in which the waste is produced and will provide a commentary highlighting how management policies and practices may inherently contribute to the production of construction waste.

1.5.1 Waste Audit Report

The measured waste quantities will be used to quantify the costs of management and disposal in a Waste Audit Report, which will also record lessons learned from these experiences which can be applied to future projects. This report will be produced by the PSCS using inputs from the Waste Audit. The total cost of construction waste management will be measured and will take account of the purchase cost of materials, handling costs, storage costs, transportation costs, revenue from sales, disposal costs etc.

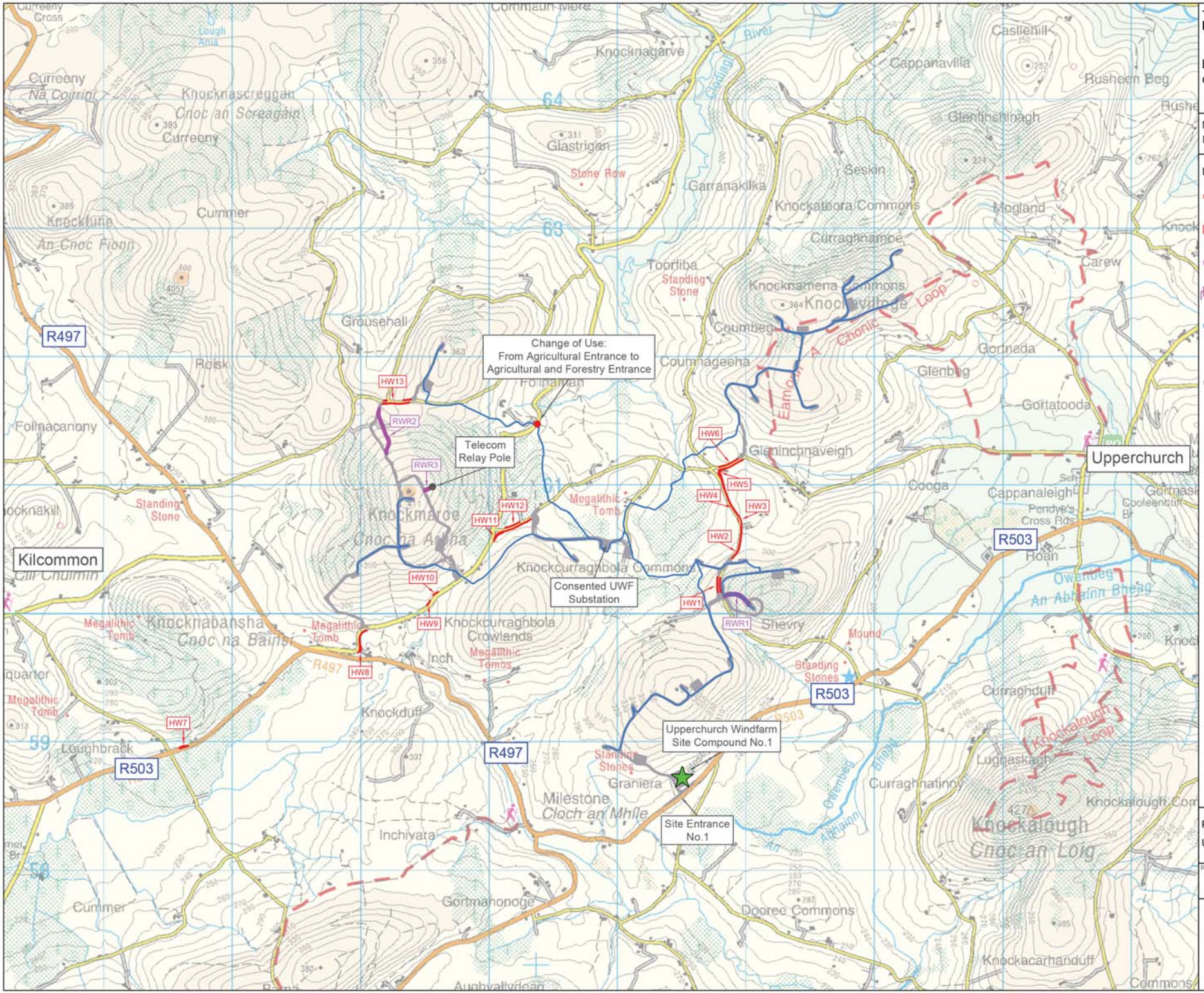
Costs will be calculated for the full range of construction waste materials, using the format shown in the table below:

Table 3: Measured waste quantities and costs

Material	Estimated Quantities & Costs
Purchase cost of general building materials i.e. import Costs	(€)
Materials Handling Costs	(€)
Material Storage Costs	(€)
Material Transportation Costs	(€)
Revenue from Material Sales	(€)
Material Disposal Costs	(€)
Material Treatment Costs	(€)
Total Waste General Building Materials Management Costs	(€)
Unit Waste General Building Materials Management Costs	(€)

(Sample relates to General Building Materials – separate record forms will be compiled in respect of each waste material and excavated soil & stone arising).
Final details of the quantities and types of construction waste arising from the Project will be forwarded to the Environment Section, Tipperary County Council.

1.6 Figures and Mapping



Title:
Figure RW WMP 1

Location of UWF Related Works on OSI Discovery Mapping

Map Number:
Map 1 of 1

Legend:

- Haul Route Works
- HW1 — Haul Route Works Numbers (HW1 - HW13)
- Realigned Windfarm Road
- RWR1 — Realigned Windfarm Road Numbers (RWR1 - RWR3)
- Internal Windfarm Cabling
- Telecom Relay Pole
- Upperchurch Windfarm (UWF)
- Upperchurch Windfarm Site Compound No.1
- R503 — Regional Road Number

Project:
UWF Related Works (RW)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	29-Mar-18	A4

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ECOPOWER

UWF RELATED WORKS

Tab 7
Revised Best Practice Measures

ECOPOWER

January 2019

Table 1: Revised List of Best Practice Measures for the UWF Related Works

BPM No.	BPM Title
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-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion 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 along the Whole UWF Project areas
RW-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas
RW-BPM-12	Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)
RW-BPM-13	Minimising the effects of lighting on bats
RW-BPM-14	Protection of potential tree and bridge bat roosts
RW-BPM-15	Bats – Post Construction Monitoring
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-18	Best practice for the protection and preservation of tree roots during the construction phase
RW-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).
RW-BPM-20	Monitoring of Identified Badger Setts
RW-BPM-21	Disturbance and/or physical injury to Other Mammals
RW-BPM-22	Management of general non-native invasive species
RW-BPM-23	Best practice methods to ensure the protection of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*).

BPM No.	BPM Title
RW-BPM-24	Best practice methods to ensure the protection of Viviparous lizard (*Lacerta (Zootoca) vivipara*)
RW-BPM-25	Measures to ensure the protection of Marsh Fritillary (*Euphydryas aurinia*)
RW-BPM-26	Local Employment and Local Sourcing
RW-BPM-27	Landowner and Land-user Liaison
RW-BPM-28	Minimising Disturbance and Damage to Land
RW-BPM-29	Minimising Dust Emissions From Site Activities
RW-BPM-30	Traffic Management Measures
RW-BPM-31	Measuring Operational EMF Emissions
RW-BPM-32	Measuring Operational Electricity Production

RW-BPM-01 **Best Practice Measure**

Title:	**Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used.**

Environmental Commitment

- Prevention of significant surface water quality impacts at watercourse crossings due to in-stream works.
- Prevention of significant morphological impacts at watercourse crossings due to open trench works.

Relevant Watercourse Crossing Points

The damming and over-pumping method will typically be carried out at watercourses where a permanent crossing structure is being installed or where an existing culvert is being replaced.

Relevant Watercourse Crossing Points: **WW1, WW2, WW4, WW12, WW13, WW14, WW21, WW22, WW24, WW25 AND WW31.**

The damming and over-pumping method will also be used at cable-only crossings where flows are very low at the time of the proposed crossing works.

Relevant Watercourse Crossing Points: **WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.**

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works as required.

Surface Water Quality Protection Measures

- In-stream works at Class 1 and Class 2 watercourses will only be done over a dry period during the months of July, August and September, as required by IFI for in-stream works, (Project Design Measure);
- Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10 meter vegetative buffer zone will be maintained (if present) between disturbed areas and the watercourse bank. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location works;
- Bog mats will be used underneath the excavator, inside the 10 meter vegetative buffer zone, to prevent soil erosion/rutting and potential surface water quality impacts from localized surface water runoff;
- A temporary sump will be constructed in the watercourse bed upstream of the proposed dam location if a natural pool does not already exist. The sump will be lined with clean rockfill to prevent scouring and erosion during pumping at the intake;
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed downstream of the dam at the pump outfall. This will prevent scouring and erosion of the watercourse bed at the outfall during pumping;
- Dams are to be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment;
- Watercourse bed excavation works will only commence once the stream flow is isolated from the proposed trench excavation area;
- Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat ground or within a local hollow area. A containment berm will be placed downslope of the excavated material which in turn will

be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;

- Any pumped water from trench dewatering will be discharged onto a well vegetated, flat, dry area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag (i.e. silt bag) (Project Design Measure). Silt fencing will also be placed downslope of the outfall;
- If there is no suitable area for discharge onto ground, temporary settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Sediment laden water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the watercourse, thus preventing potential water quality impacts;
- If concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream work, the watercourse crossing will be restored to its original configuration and stabilized to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and watercourse sediments will be kept to the minimum required for the cable laying process to avoid any unnecessary impact on the watercourse morphology;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refueling allowed within 100m of the watercourse crossing (Project Design Measure);
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (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.

RW-BPM-02 **Best Practice Measure**

Title:	**Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used.**

Environmental Commitment

- Prevention of significant surface water quality impacts during watercourse crossing works in-stream works.
- Prevention of significant morphological impacts at watercourse crossings due to in-stream works.

Relevant Watercourse Crossing Points

The flume/pipe watercourse crossing method will typically be used where a temporary watercourse crossing structure is proposed.

Relevant Watercourse Crossing Points: **WW5, WW7, WW8, WW16 and WW27**

The flume/pipe watercourse crossing method will also be used at cable-only crossings where flows are too large to be managed by the dam and over pump method at the time of the proposed crossing works.

Relevant Watercourse Crossing Points: **WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.**

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- In-stream works at Class 1 and Class 2 watercourses will only be done over a dry period during the months of July, August and September, as required by IFI for in-stream works, (Project Design Measure);
- Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10 metre vegetative buffer zone will be maintained between disturbed areas and the watercourse. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location works;
- Bog mats will be used underneath the excavator inside the 10 metre vegetative buffer zone to prevent soil erosion/rutting and potential water quality impacts from localised surface water runoff;
- A pipe/flume with sufficient capacity/size to accommodate flow in the stream will then be placed in the watercourse without disturbance of the watercourse bed;
- The pipe within the watercourse will have impervious dams placed on both the upstream and downstream ends to prevent flow within the channel along the proposed trench location (the upstream dam will be placed first);
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed downstream of the pipe/flume outfall. This will prevent scouring and erosion of the watercourse bed at the outfall;
- Dams are to be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment;
- Only once the watercourse flow is isolated from the excavation area, will the watercourse bed excavation works be allowed to commence (Project Design Measure);
- Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;

- Sediment laden water from trench dewatering will be discharged onto a well vegetated, flat, dry area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag. Silt fencing will be placed downslope of the outfall;
- If there is no suitable area for discharge onto ground, temporary settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Sediment laden water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
- Once the lean mix concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream work, the stream crossing will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required;
- If the watercourse crossing is to be used as a temporary crossing for construction machinery, double silt fencing and berms will be placed at the crossing to prevent sediment/runoff from the access road surface entering the watercourse;
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and watercourse sediments will be kept to the minimum required for the cable laying process to avoid unnecessary impact on the watercourse morphology;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refuelling allowed within 100m of the watercourse crossing;
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (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.

RW-BPM-03 **Best Practice Measure**

Title:	**Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used.**

Environmental Commitment

Prevention of significant surface water quality impacts at stream crossings due to in-stream works.

Work Sections/Locations

No planned location, BPM included on a precautionary basis

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- As the watercourse is Class 1, the in-stream works will only be done over a dry period in the months of July, August or September, as required by IFI for in-stream works (Project Design Measure);
- Firstly, the works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10 meter vegetative buffer zone will be maintained between disturbed areas and the watercourse. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location;
- Bog mats will be used underneath the excavator inside the 10 meter vegetative buffer zone to prevent soil erosion and potential water quality impacts from localised surface water runoff;
- Temporary storage of excavated overburden from the diversion channel will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
- The watercourse dam (in the stream to be diverted) will be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment (the dam will be installed once the diversion channel is in place);
- The banks and bottom of the diversion channel will be lined with impermeable geotextile to prevent erosion and surface water quality impacts. A layer of clean course gravel will be placed over the geotextile on the bed of the channel to keep it in place;
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed and opposing bank of the receiving watercourse downstream of the diversion channel. This will prevent scouring and erosion of the watercourse bed and bank at the outfall during diversion;
- Watercourse bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area;
- Temporary storage of excavated material from the crossing trench will be undertaken separately to the material from the diversion channel. All storage areas will be outside the 10m buffer zone. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
- Sediment laden water from trench dewatering will be discharged onto a well vegetated, dry, flat area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing;

- If there is no suitable area for discharge onto ground, settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Any water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
- Once the lean mix concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream works, the stream crossing and will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);
- The diversion channel will be backfilled and reinstated to its original level and rock armour will be placed at the stream banks where the inflow and outflow of the diversion channel previously existed;
- The ground surface along the reinstated diversion channel will be re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing on either side of the stream buffer will be left in place and maintained until the disturbed ground has re-vegetated;
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and stream sediments will be restricted to the minimum required for the cable laying process to avoid unnecessary impact on the stream morphology;
- There will be no batching or storage of cement allowed at the stream crossing;
- There will be no refuelling allowed within 100m of the stream crossing;
- All plant will be checked for purpose of use prior to mobilisation at the stream crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (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.

RW-BPM-04 **Best Practice Measure**

Title:	**Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert.**

Environmental Commitment

Prevention of significant surface water quality impacts from sediment input during widening or replacing an existing culvert crossing. Typically this work will be undertaken where there is a requirement to widen an existing road at a watercourse crossing or where the existing culvert is inadequate for crossing with construction traffic.

Work Sections/Locations

Existing culverts will be replaced at the following locations:

Relevant Watercourse Crossing Points: **WW12, WW21 and WW31**

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- Replacing / extending of culverts in watercourses of ecological importance (Class 1 and Class 2 type watercourses) will only be done over a dry period between July and September (as required by IFI);
- When the watercourse is Class 1 or Class 2, and there is a requirement to disturb either the bed or bank, the watercourse will be dammed upstream and pumped prior to work commencing (refer to RW-BPM-01);
- Where culverts in drains (Class 4) or low ecological importance (Class 3) are being replaced, temporary check dams / silt fencing arrangements will be placed within the drain downstream of the crossing location. No damming or over pumping will be necessary unless flows are significant;
- If a cable is being placed beneath the culvert and dewatering of the excavation is required, please refer to RW-BPM-01 or RW-BPM-02 for water management / water quality protection measures;
- Where culvert widening has been completed, only clean, well-sorted fill or hardcore will be used to widen the road at the crossing location. Poorly sorted material will not be used as it would be a potential source of fine sediment;
- Before the road surface layer is put in place, a layer of geotextile will be placed over the fill to prevent wash down of fines into the fill and potentially into the watercourse;
- A temporary berm (i.e. sandbags and/or rectangular straw bales) will placed along the edge of the access road to prevent loose material being dislodged or washed into the watercourse;
- Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;
- If high levels of silt or other contamination is noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface watercourses;
- All disturbed ground will be re-seeded at the soonest opportunity to prevent erosion;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refuelling allowed within 100m of the watercourse crossing; and,
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.

References

- IFI (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.

RW-BPM-05 **Best Practice Measure**

Title:	**Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse.**

Environmental Commitment

Prevention of significant surface water quality impacts from sediment input when excavation works (cable trenching, temporary, permanent access construction, haul route works etc.) are being carried out within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA blueline equivalent).

Work Section/Location

- Trench excavations and access road construction will run over / adjacent / parallel to Class 1 or Class 2 watercourses at UWF Related Works sections **SW12, SW24, SW25, SW26, SW27, SW28, SW52, RW3, SW53, SW54, SW55, SW67, SW68 and HW11**;

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- Where works are proposed within the 50m watercourse buffer zone, additional mitigation will be employed to ensure the watercourse is protected;
- Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted;
- Where the cable trench / access road / works area is running adjacent and parallel to a watercourse (all watercourse types, Class 1 to Class 4), a minimum 5m buffer will be maintained between the works area and the watercourse edge;
- Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m watercourse buffer;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;
- Additional silt fencing or temporary straw bales (rectangular bales, pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards a local watercourse;
- Where the cable trench / access road route slopes down perpendicular towards a watercourse (*i.e.* base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the works corridor to dissipate surface water runoff from the works area and onto adjacent vegetated ground. Additional silt fencing will be put at the outfall location of the bunds / swales;
- Temporary check dams / silt fencing arrangements will be placed in any local artificial watercourses/drains (Class 4 and Class 5 watercourses) within 30m of the works corridor (this will also include existing road drains along the haul route works);
- The check dams / silt fencing arrangements will be placed every 10m;
- Bog mats will be used in wet / boggy areas zone to prevent ground rutting and soil erosion which could lead to potential water quality impacts. All ground rutted by vehicles / machinery will be levelled or backfilled to prevent their progression as preferential pathways for surface water runoff;
- If high levels of silt or other contaminants are noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface watercourses;
- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion;
- All temporary surface water control / protection measures such as silt fencing and check dams will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken;

- Where the cable trench route runs downslope for long distances (>50m) towards a watercourse, regular spaced impermeable bunds will be placed within the trench backfill to prevent the trench acting as a drain towards the stream thus preventing potential water quality impacts from surface water drainage within the trench;
- There will be no refuelling allowed within 100m of a watercourse; and,
- All plant will be checked for purpose of use prior to mobilisation.

References

- IFI (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.

RW-BPM-06 **Best Practice Measure**

Title:	**Surface Water Quality Protection Measures During Tree Felling Works.**

Environmental Commitment

Prevention of significant surface water quality impacts from sediment/nutrient input during coniferous tree felling.

Work Sections/Locations

- Coniferous tree block felling will be required at the following locations: RWR1/SW16 and SW24

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise tree felling works and drainage works.

Pre-felling surveys

- Inspection of main drainage ditches and outfalls will be completed during wet periods, and well in advance of the proposed felling works;
- Another full inspection of the proposed felling area will be completed by the Construction Manager one day in advance of the proposed felling works;
- Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines;
- Inspection of all areas reported as having unusual ground conditions; and,
- Pre-felling surface water sampling will be undertaken at the main watercourse downstream of the works area (sampling will be completed during a wet period).

Protection of watercourses during felling works

- Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance;
- Checking and maintenance of roads and culverts will be undertaken by the Construction Manager throughout the felling operation;
- No tracking of vehicles through watercourses will occur, as vehicles will use road infrastructure and watercourse crossing points;
- Drains which flow from the areas to be felled will have temporary silt traps installed;
- Where felling is to be completed inside the 10 – 25m aquatic buffer zone along a watercourse, double silt fencing will be arranged downslope of the proposed works area;
- Brash mats or bog mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding will occur;
- Timber will be stacked in dry areas away from surface water buffer zones. Temporary rectangular straw bales to be emplaced on the down-gradient side of timber processing areas;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff;
- Following tree felling all drains will be inspected to ensure that they are functioning and silt traps will remain in place until all disturbed ground has stabilised;
- Extraction tracks near drains will be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining vegetated ground. Silt fencing will be installed downslope of any diversion channels where ground has been broken or disturbed;
- All accumulated silt will be removed from existing drains, culverts and silt traps. This removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall.

Post-felling surveys
• Post-felling surface water sampling will be undertaken at the main watercourse downstream of the works area (sampling will be completed during a wet period).
References
• Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh; • Coillte (2009): Forest Operations & Water Protection Guidelines; • Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures; and, • Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford.

RW-BPM-07 **Best Practice Measure**

Title:	**Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds.**

Environmental Commitment

Prevention of significant surface water and groundwater quality impacts during use of Cement Based Compounds.

Work Sections/Locations

- Internal Windfarm Cabling – public road crossing locations and
- Telecom Relay Pole - foundations

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Ensure best practice e storage and use of Cement Based Compounds.

Protection Measures

- No washing out of any plant or equipment used in concrete transport or concreting operations will be allowed along the route;
- Any spills no matter how small or material or overburden contaminated with cement mix will be moved off-site for disposal at a licensed premises;
- No batching of wet-cement products will occur on site (Project Design Measure).
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete will be delivered on site, only the chute will need to be cleaned, using the smallest volume of water practicable. Cement wash water will be collected in a sealed, temporary lagoon which will be placed at least 50m from a watercourse;
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be tanked and removed from the site to a suitable, non-polluting, discharge location;
- Weather forecasting will be used to plan dry days for pouring concrete;
- The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.

Monitoring Measure

- Regular pH monitoring of the construction drainage water will be completed. When there is an increase of pH above the natural baseline in the local stream, pH adjustment will be undertaken prior to the release of the surface water drainage.

References

- IFI (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.
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006)
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors.

RW-BPM-08 **Best Practice Measure**

Title:	**Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals.**

Environmental Commitment

Prevention of significant water quality impacts during storage and handling of fuels, oils and chemicals.

Work Sections/Locations

- Construction works area boundary

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Ensure best practice use and storage of fuels, oils and chemicals on-site.

Manage of on-site refueling

- On site re-fuelling of immobile machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located;
- The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages;
- The fuel bowser will be parked on a level area in the construction compound when not in use and only designated, trained and competent operatives will be authorised to refuel plant on site;
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- All generators and suction pumps used at watercourse crossing locations will have a double skinned fuel tank or be placed on a drip tray; and,
- There will be no storage of fuel or refuelling or mobile plant permitted within 100m of a watercourse.

Storing fuel properly

- Fuels stored on site will be minimised. Storage areas, which will be located at the temporary compounds, will be bunded appropriately for the fuel storage volume for the time period of the construction (Project Design Measure).

Monitoring Measure

- Regular pH monitoring of the construction drainage water will be completed. When there is an increase of pH above the natural baseline in the local stream, pH adjustment will be undertaken prior to the release of the surface water drainage.

Avoid leakage from plant and tools

- The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.

Contingency for spillages

- An emergency plan for the construction phase to deal with accidental spillages is contained within Environmental Management Plan (Section 6).
- Spill kits will be available to deal with any accidental spillage in and outside the refuelling area; and,
- Any spills no matter how small or material or overburden contaminated with fuel/oil will be moved off-site for disposal at a licensed premise.

References

- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006).
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.
- EMP for UWF Related Works, Section 6: Environmental Emergency Procedure for Oil/Fuel Spillage

RW-BPM-09 **Best Practice Measure**

Title:	**Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk**

Environmental Commitment

Prevention of flooding at watercourse crossings due to undersized culverts / bridges.

Work Sections/Locations

Relevant Watercourse Crossing Points: **WW1, WW12, WW13, WW15, WW21, WW24, WW25 and WW31** (Class 4 water crossings), also **WW14** (Class 3 water crossings), also **WW2, WW4 and WW22** (Class 2 water crossings).

Responsibility of	**Role/Duty**
Construction Manager	• Ensure appropriate culvert/bridge design. • Supervise the construction works.

Surface Water Quality Protection Measures

- All permanent culverts/bridges will be sized to cope with a minimum 100-year flood event (Project Design Measure);
- A freeboard of 300mm, or as required by OPW, will be kept below the crossing structure during a 100-year flood event;
- At a minimum, all new pipe culverts will be 900mm in diameter regardless of the anticipated flood flow (Project Design Measure) (*i.e.* minimum 900mm culvert will be used in Class 3/Class 4 watercourses regardless of flows);
- New and replaced permanent crossing structures will be construction in accordance with the Office of Public Works (OPW) guidelines Construction, Replacement or Alteration of Bridges and Culverts (2013),
- As agreed with OPW (telephone consultation, February 2018) will be subject to a Section 50 application to OPW following the grant of planning permission.

References

- The Planning System and Flood Risk Management Guidelines (DoEHLG, 2009).
- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

RW-BPM-10 Best Practice Measure

Title:	**Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas.**

Environmental Commitment

Prevention of significant surface water quality impacts during Temporary Storage of Overburden.

Work Sections/Locations

Temporary overburden storage will be located at the following locations:

Internal Windfarm Cabling, construction works area boundary

Haul Route Works locations

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works

Surface Water Quality Protection Measures

- No temporary overburden storage areas will be permitted within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA unmapped blueline equivalent) watercourse (**Project Design Measure**);
- Sloping ground and areas with wet ground conditions / ponding will be avoided;
- Where possible, the temporary overburden storage area will be located on vegetated ground as the existing vegetation will act as an effective buffer against any sediment in runoff from the storage area;
- The overburden mound will not be compacted, nor will the surface of the mound be smoothed or battered back as rough surfaces on overburden mounds increase infiltration and reduce surface water runoff and erosion;
- A perimeter of double silt fencing will be placed around the temporary storage area. Silt fencing will be checked on a daily basis and replaced when necessary;
- Temporary check dams and silt fencing arrangements will be placed in local Class 4 watercourses (Drains) and Class 3 watercourses (Marginal Watercourses) if they exists within 20m of the storage area;
- Where the temporary overburden storages areas are located in forestry, temporary blocking of mound drains/rills will be undertaken downslope of the storage area. All existing roadside drains will have temporary check dams installed;
- During periods of heavy rainfall a sheet of polyethene or a geotextile will be used to cover the overburden to prevent erosion; and,
- All temporary overburden storages areas will be checked / monitored on a daily basis until stabilised to ensure no drainage issues of surface water quality impacts are occurring.

References

- IFI (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; and,
- CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.

RW-BPM-11 Best Practice Measure

Title:	**Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas.**

Environmental Commitment

Prevention of significant surface water quality impacts during Permanent Storage of Overburden.

Work Sections/Locations

Permanent overburden storage will be located at the following locations:

- Telecom Relay Pole

- Realigned Windfarm Roads

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- No permanent overburden storage areas will be permitted within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA unmapped blueline equivalent) watercourse (Project Design Measure);
- Sloping ground and areas with wet ground conditions will be avoided;
- If possible, within grassland, the permanent overburden storage area will be located on vegetated ground as the existing vegetation will act as an effective buffer against any sediment in runoff from the storage area until it has stabilised by vegetation;
- Within grassland, a perimeter of double silt fencing or a sand bag/geotextile berm will be placed around the permanent storage area until the mound has stabilised by vegetation;
- Where the permanent overburden storages areas are located in forestry, temporary blocking of mound drains/rills will be undertaken downslope of the storage area until the mound has stabilised by vegetation;
- At permanent storage areas along proposed permanent access roads or existing roads (*i.e.* forestry tracks and farm tracks) silt trap / silt fence arrangements will be placed within the proposed / existing road drainage and left in place until the mound has stabilised by vegetation;
- The overburden mound will be seeded at the soonest opportunity to prevent erosion; and,
- All permanent overburden storages areas will be checked / monitored on a weekly basis until stabilised to ensure no drainage issues of surface water quality impacts are occurring.

References

- IFI (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; and,
- CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.

RW-BPM-12 Best Practice Measure

Title:	**Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)**

Environmental Commitment

To identify and monitor breeding Hen Harrier

Work Sections/Locations

2km buffer of UWF Grid Connection construction works areas, UWF Related Works/UWF Replacement Forestry/Consented Upperchurch Windfarm/ Windfarm and UWF Other Activity Locations located within or adjacent to suitable Hen Harrier habitat- including the UHHS.

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Carrying out of surveys to Best Practice guidance for nesting Hen Harrier. • Must be aware of the best practice guidance listed in References below.

Surveying of nesting and roosting Hen Harrier

- Monthly surveys following (SNH) guidance will be undertaken by a suitably qualified Ornithologist
- Confirmatory hen harrier breeding surveys will be completed, before construction works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary (Project Design Measure). Breeding Surveys will take place monthly between February and August of the construction year and will be targeted at confirming breeding attempts and/or nest locations within the 2km buffer area utilized to establish baseline conditions.
- Confirmatory hen harrier roosting surveys will be completed, within 1000m of the construction works boundary. Roosting surveys will take place monthly between October and February of the construction year and will be targeted at confirming roosting locations within the 1km buffer area utilized to establish baseline conditions.
- These surveys (both breeding and roosting) will be completed prior to the start-up of all construction activities, until construction is complete and for 4 years thereafter (Years 1-3 and Year 5) (Project Design Measure).
- Surveys will also be undertaken in years coinciding with any National Surveys of Hen Harrier to fully inform future trends in respect of the Slievefelim to Silvermines Mountains SPA.
- A report including nesting activity, levels of usage and any disturbance events, will be provided to the Competent Authority and NPWS following the completion of each survey season.
- 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.

Construction Works Restrictions

- No construction works for UWF Related Works will take place during the breeding season March to August (Project Design Measure).
- A temporal construction exclusion zone of 1000m will be established around identified Hen Harrier roost locations during the winter roosting season (October to February inclusive). The temporal exclusion zone will be established by a suitably qualified Ornithologist and will be strictly adhered to by all personnel involved in the construction works. Construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset (Project Design Measure).

Compliance Monitoring

- The temporal exclusion zone will be monitored by a suitably qualified Ornithologist.
- The Ornithologist with have 'stop works' authority.

- Any non-compliance will be recorded in a register and included in a report to be provided to the competent authority following the completion of the construction stage.

Operational Works Measures

- During the Operational Phase a suitably qualified Ornithologist will be present during any required maintenance works along the 110kV UGC within the SPA to ensure no breeding Hen Harrier are disturbed.

Construction Stage Dust Effects

- If dust issues start to occur proximal to sensitive nest locations, the Project Ecologist/Ornithologist will report the issue to the Environmental Clerk of Works, who will require the Construction Contractor to minimize dust emissions, as per Best Practice Measure RW-BPM-29.

References

- **Scottish National Heritage (2014)** Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities http://www.snh.gov.uk/docs/C278917.pdf.
- **Ruddock and Whitfield (2007)** A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage. http://www.snh.org.uk/pdfs/strategy/renewables/BIRDSD.pdf

RW-BPM-13 Best Practice Measure

Title:	**Minimising the effects of lighting on bats**

Environmental Commitment

To avoid displacement or disturbance of bats arising from the use of artificial lighting.

Work Sections/Locations

150m around all UWF Related Works construction works areas

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of works
Project Ecologist	• The Project Ecologist will liaise with NPWS throughout the construction stage and early operational stage. • Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

Design principles for lighting

- All known bat roosts within 150m of the construction works areas will be subject to confirmatory survey prior to the onset of construction works in order to identify any changes in the interim period since baseline establishment. Surveys will be carried out at a time of year that is appropriate to the type of roost e.g. June to August for maternity roosts, or November to February for hibernation roosts. This will ensure that the Project Ecologist has accurate information regarding the location and status of roosts, and that the lighting proposals can be adapted accordingly, if required.
- The Project Ecologist will communicate all bat survey results and information to the Project Team. This information will also be issued to the Local Authority and relevant statutory consultees, as agreed at the consenting stage.
- In general, the use of lighting will be avoided throughout the scheme, as most of the surrounding landscape is of at least local importance for bats.
- All construction works will be carried out during daylight hours (Project Design Measure).
- Security lighting will be used at compounds. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational (Project Design Measure).
- Lights would be operational for 30 seconds and would then switch off automatically.
- Additionally, lights will be directed only onto the required area, in conjunction with the ECoW, the Contractor will choose lighting in accordance with Guidance Notes for the Reduction of Obtrusive Light GN01-2011 when deciding on lighting;
- Low UV-lighting bulbs, such as low-UV LEDs or low / high pressure sodium lamps will be used. Mercury or metal halide bulbs will not be used.

References

- Stone, E.L. (2013) Bats and lighting: Overview of current evidence and mitigation guidance. University of Bristol
- Bat Conservation Trust (2008). Bats and the Built Environment Series: Bats and Lighting in the UK
- Bat Conservation Ireland (2010). Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers

RW-BPM-14 Best Practice Measure

Title:	**Protection of potential tree and bridge bat roosts**

Environmental Commitment

Best Practice measures in respect of direct disturbance or destruction of potential tree and bridge roosts throughout the pre-construction, during construction and operational phases of the development.

Work Sections/Locations

Tree felling locations, bridges along haul routes and works areas

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Pre-construction confirmatory surveys will be carried out by the Project Ecologist (under license) on all bat roosts identified within the zone of effect of works boundary. • The Project Ecologist will liaise with NPWS throughout. • Monitoring felling and pruning works on trees with bat suitability. • Must be aware of the best practice guidance listed in References below.

Survey Measures for Potential Tree Roosts

- All trees that require felling or other modifications (e.g. branch removal, trimming) will be subject to a confirmatory ground-level visual inspection by the Project Ecologist prior to the onset of works.
- All trees with moderate or high suitability for bats will have a presence / absence bat detector survey during the season of peak activity (usually May to September, inclusive).
- Trees of negligible or low suitability generally do not require a presence / absence bat detector survey, but this will be reviewed by the Project Ecologist.
- The Project Ecologist will communicate all bat survey results and information to the Project Team. This information will also be issued to the Local Authority and relevant statutory consultees, as agreed at the consenting stage.

Tree Felling measures

- Trees with low suitability for bats will be cut in sections by a suitably qualified tree surgeon, and all sections with crevices or cavities will be lowered carefully to the ground and left undisturbed for 48 hours before removal.
- Any trees of moderate or high suitability will have a presence / absence bat detector survey prior to felling. If roosting bats are present, the consultant will develop a case-specific mitigation strategy (e.g. seasonal restrictions on felling works, fitting of exclusion tubes at roost entrances), and apply to the NPWS for a derogation licence. Any bats will be permanently excluded from the tree before felling, and replacement roosting opportunities (i.e. bat boxes) will be provided.
- If a tree of moderate or high suitability is surveyed and no bats are recorded, then it will be felled immediately. It will be cut in sections by a tree surgeon, and all sections with crevices or cavities will be lowered carefully to the ground and left undisturbed for 48 hours before removal.

Derogation Licenses

- Any requirement for derogation from the European Communities (Birds and Natural Habitats) Regulations 2011 will be reviewed by the Project Ecologist following consultation with local representatives of the National Parks and Wildlife Service.

Avoid effects on bats through disturbance or destruction of potential bridge roosts.

- Structures which were previously identified as having no potential for bats (no suitable crevices) (Grade 0; Billington and Norman, 1997) will require a visual inspection to confirm that the previous assessment remains

valid and no suitable crevices have formed in the intervening period. If the structure remains unsuitable for bats, no additional surveys are required.

- All bridges which were previously identified as having evidence of bats or suitable crevices for bats (Grade 1 to 3; Billington and Norman, 1997) will have a visual inspection (using lights, fiberscope, etc.) and bat detector surveys (to be undertaken throughout the duration of the night and include dusk emergence and dawn swarming periods) will be undertaken prior to the commencement of bridge maintenance/upgrade works to determine if bats are using the structure at the time of any works.
- If no bats are found to be present during the surveys but suitable crevices are present, these will be temporarily blocked in advance of works to ensure bats do not occupy the structure in the intervening period.
- If bats are found in any bridges, the Project Ecologist will develop a case-specific mitigation strategy (e.g. seasonal restrictions on works, fitting of exclusion valves at roost entrances, blocking of unoccupied crevices) and apply to the NPWS for a derogation license for the proposed works.
- If undertaken, any maintenance/upgrade works will include the conservation of a number of the most suitable crevices in the bridge structure as part of the works programme. If the complete loss of all suitable crevices is unavoidable, mitigation measures in the form of bat boxes and/or bat tubes will be erected on the bridge to provide alternative roosting opportunities. The number and placement of the bat boxes and/or tubes will be determined by a bat specialist.

References

- National Roads Authority (2005). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority, Dublin.
- Billington, G.E. and Norman, G.M. (1997). A Report on the Survey and Conservation of Bat Roosts in Bridges in Cumbria. Kendal, English Nature
- Kelleher, C. and Marnell, F. (2006). *Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

RW-BPM-15 Best Practice Measure

Title:	**Bats – Post Construction Monitoring**

Environmental Commitment

Operational monitoring of bat roosts and sensitive severed hedgerow locations post construction to monitor effects (if any) from the construction of the UWF Related Works

Work Sections/Locations

Bat roost identified during baseline evaluations, Bat Crossing locations in field boundaries along the works area

Responsibility of	**Role/Duty**
Project Ecologist	• Post-construction activity surveys. • Liaising with NPWS. • Must be aware of the best practice guidance listed in References below.

Operational Surveys

- Post-construction activity surveys will be carried out annually by the Project Ecologist
- Roost surveys on roosts identified as part of baseline evaluation will be carried out under Licence within the suitable survey season as per Best Practice,
- All hedgerow locations subject to Bat Crossing Structures and reinstatement measures will also be surveyed by a suitably qualified Bat expert within the suitable survey season as per Best Practice.
- Surveys will be carried out annually during the early operational years and will continue until all revegetation has reached maturity and bat habitat severance effects are closed out. i.e. 6 years
- At the end of this period, if necessary, recommendations will be made on further survey requirements following consultation with NPWS.
- Results will be made available to the Local Authority and relevant statutory consultees in the form of an annual report.

References

- National Roads Authority (2005). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority, Dublin.
- Billington, G.E. and Norman, G.M. (1997). A Report on the Survey and Conservation of Bat Roosts in Bridges in Cumbria. Kendal, English Nature
- Kelleher, C. and Marnell, F. (2006). *Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

RW-BPM-16 Best Practice Measure

Title:	**Monitoring of non-native invasive plant species.**

Environmental Commitment

Monitoring of non-native invasive plant species.

Work Sections/Locations

All construction works sections and operational stage wayleave areas

Responsibility of	**Role/Duty**
Project Ecologist	• Implementation of surveying • Must be aware of the best practice guidance listed in References below.

Avoid adverse effects of the introduction and spread of non-native invasive species

- Monitoring in the form of confirmatory surveys will be carried out by the Project Ecologist to accurately determine the current status of invasive species locations identified during baseline studies.
- Surveying will be carried out each year of operation and this survey information will be used to inform any operational stage maintenance activities. Surveys will focus always on the works area plus 7m. Surveying of municipal areas – i.e. public road haulage routes, will not be included in surveys.
- The results of this will be made available to Project Team, and any bodies as agreed at the consenting stage.
- The measures included in the Invasive Species Management Plan will be implemented.

References

- National Roads Authority (2010). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. National Roads Authority, Dublin.
- EMP for UWF Related Works - Invasive Species Management Plan.

RW-BPM-17 Best Practice Measure	
Title:	**Best practice measures for the removal of vegetation during construction.**
Environmental Commitment	
To ensure the protection of species using hedgerow and scrub habitat during the construction phase.	
Work Sections/Locations	
All sections	
Responsibility of	**Role/Duty**
Project Manager	• Inform Project Ecologist of any requirement to clear scrub or remove hedgerows during the nesting and breeding season (1st March to 31st August inclusive).
Construction Manager	• Scheduling of construction activities
Project Ecologist	• The Project Ecologist will be aware of all areas of hedgerow and scrub habitat which require removal during the construction phase, giving particular regard to the statutory restrictions on vegetation clearance, (the relevant statutory provisions are listed in References)

Measures to ensure protection of species using hedgerow and scrub habitat

Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000, restricts the cutting, grubbing, burning or destruction by other means of vegetation growing on uncultivated land or in hedges or ditches during the nesting, and breeding season for birds and wildlife, from 1st March to 31st August, inclusive.

Please note that all removed hedgerows or parts thereof, will be replaced to ensure that linear habitats remain unaffected in the long term.

The following approach will be taken in order to comply with the Wildlife Acts:

- Where practical, vegetation clearance will be carried out outside of the restricted period (1st March to 31st August).
- Where clearance is required within the closed season, a survey will be carried out by the Project Ecologist for the presence of active birds' nests (i.e. nests with eggs or young birds). If such are found, where feasible the area will be avoided until the nesting attempt is complete. If avoidance is not feasible, such as where all works along one section of the route need to be completed to avoid incursions into the area at a later stage, the Project Ecologist will seek a derogation license from the NPWS. Such works cannot take place until this derogation license is received.
- Construction works practices will incorporate fire prevention measures at all works areas

References

- Statutory provisions in relation to breeding birds, namely Section 46(a) of the Wildlife (Amendment) Act 2000;
- Statutory provisions in relation to bats and bat roosts, namely, Wildlife Acts, 1976 and 2000, and the EU Habitats Directive (Under S.I. 94 of 1997).

RW-BPM-18 Best Practice Measure

Title:	**Best practice for the protection and preservation of tree roots during the construction phase**

Environmental Commitment

To ensure the protection and preservation of tree roots during the pre-construction and during construction phase.

Work Sections/Locations

All sections

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• The Project Ecologist will be aware of all trees which are to be retained and preserved during the construction and/or decommissioning phase, giving particular regard to the statutory restrictions on vegetation clearance. The relevant Statutory provisions are listed in References below. • Must be aware of the best practice guidance listed in References below.

To ensure the protection and preservation of tree roots during the pre-construction and during construction phase

- All works within a Root Protection Area (RPA) (see NRA guidance (2006) for calculation of the RPA) will be supervised by the Project Ecologist.
- An important point to remember, prior to the design and installation of protective barriers, are that roots are often asymmetric so an arbitrarily chosen circular protection zone can often prove to be inadequate. Asymmetry of roots can be suspected if the ground is sloping to one side or if there are other variables restricting root development.
- The instalment of protective measures and the undertaking of all remedial works will be carried out prior to commencement of any construction activity at the RPA.
- Any remedial works required to trees identified for retention will be carried out prior to construction by qualified tree surgeons in accordance with BS 3998 (1989) Recommendations for tree work.
- Vertical barriers and/or ground protection will protect all trees that are being retained on site. These provisions will be put in place prior to any development work or soil excavations are carried out within the RPA.
- The purpose of protective barriers is to exclude any harmful construction activity that may damage the RPA. They also help protect the main stem of the tree.
- Tree protection barriers will be fit for the purposes of excluding construction activities and be durable to withstand an impact. The barrier will consist of a vertical and horizontal frame and will be at least 2.3m in height.
- Clear concise signage will be affixed to the barrier in an unrestricted easily viewed location. The signage must specify that no construction activity is to take place within the RPA. This will remain the place until completion of all works unless certain works are deemed acceptable following consultation with an arborist.
- The signage must also state that no materials of any description are to be stored or the “spilling out” of materials will not occur within the RPA.
- Consultations with a qualified arborist will be undertaken if required during the development, if certain construction activities within the RPA are unavoidable, e.g. excavation works.
- Any excavation works carried out within the RPA will be undertaken with extreme care and will be carried out with due diligence, avoiding damage to the protective bark covering larger roots. This may involve excavation by mini-digger and/or hand as deemed appropriate.
- Exposed roots will be wrapped in hessian sacking to avoid desiccation and roots less than 2.5cm in diameter can be pruned back to a side root.
- The advice of a qualified arborist will be sought if larger roots that influence anchorage of the tree need to be severed.

- Toolbox talks with site personnel will include the relevant best practice measures above and all site personnel will be made aware of the importance of the protective barrier.
- In general, a ground alteration in excess of 75mm will be avoided.
- Changes in ground levels in the vicinity of a tree may alter the existing soil hydrology and may necessitate the incorporation of adequate drainage around the tree.

References

- Section 46(a) of the Wildlife (Amendment) Act 2000
- Tree Preservation Orders (TPO), which are made under Section 205 of the Planning and Development Act, 2000
- Statutory provisions in relation to bats and bat roosts, namely, Wildlife Acts, 1976 and 2000, and the EU Habitats Directive (Under S.I. 94 of 1997).
- BS 3998 (1989) Recommendations for tree work
- NRA (2006). Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes. National Roads Authority, Dublin.

RW-BPM-19 Best Practice Measure

Title:	**Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).**

Environmental Commitment

To avoid disturbance/displacement of nesting Kingfisher throughout the construction phase of the development.

Work Sections/Locations

All watercourse crossing locations

Responsibility of	**Role/Duty**
Project Manager	• Scheduling of construction activities
Project Ecologist	• Carrying out surveying to Best Practice guidance. • Must be aware of the best practice guidance listed in References below.

Avoid disturbance and/or displacement of nesting Kingfisher during pre-construction and during construction phase of the development.

- Confirmatory surveys will be carried out by a suitably qualified Ornithologist and will follow standard methodology (Cummins *et al*, 2010),
- Surveys will be undertaken between March and April (early visit) and again between May and June (late visit) of the construction year and will be targeted at confirming breeding attempts and/or nest locations along rivers within 300m of works area boundary (No nests were located within 300m during baseline surveys).
- All crossing locations will be also be surveyed to confirm Kingfisher suitability both in terms of nest banks and suitable bankside vegetation at the time of construction.
- No construction activities will be permitted within the temporal construction exclusion zone (500m) around identified nest locations during the bird breeding season (March – August inclusive or until nesting is confirmed as complete following supervision by a suitably qualified Ornithologist).
- Channel and bankside vegetation (trees, scrub etc.) where confirmed as suitable for Kingfisher, will be left untouched where possible to retain branches for foraging Kingfishers and to minimize disturbance to nesting birds.
- At least some marginal vegetation will be retained on suitable Kingfisher nesting banks - if present. These are mostly vertical banks over one meter in height, composed of soft material into which they can dig their burrows.

Other Riparian Bird Species

- During Kingfisher surveys, all crossing locations will also be surveyed to confirm the presence or absence of other aquatic/riparian species such as Dipper, Grey Wagtail.
- If present at watercourse crossing locations, Statutory provisions in relation to breeding birds, namely Section 46(a) of the Wildlife (Amendment) Act 2000 will be fully adhered with

References

- Cummins, S., Fisher, J., McKeever, R.G., McNaghten, L., and Crowe, O. (2010) Assessment of the distribution and abundance of Kingfisher (Alcedo atthis) and other riparian birds on six SAC river systems in Ireland. National Parks and Wildlife Service and BirdWatch Ireland.
- https://www.npws.ie/sites/default/files/publications/pdf/Cummins_et_al_2010_Kingfisher_survey.pdf
- Crowe, O. (2010) Ecological Impact Assessment (EcIA) of the Effects of Statutory Arterial Drainage Maintenance Activities on Kingfisher (Alcedo atthis) and other riparian birds II. Office of Public Works and BirdWatch Ireland. http://www.opw.ie/en/media/Issue%20No.%2012%20%20EcIA%20Kingfisher%20Alcedo%20atthis%20and%20other%20Riparian%20Birds%20II.pdf

RW-BPM-20 Best Practice Measure	
Title:	**Monitoring of Identified Badger Setts**
Environmental Commitment	
Monitoring of identified Badger setts during the operational phase of the development.	
Work Sections/Locations	
All setts identified in baseline surveys	
Responsibility of	**Role/Duty**
Project Ecologist	• Must be aware of the best practice guidance listed in References below.

Monitoring of identified Badger setts during the operational phase of the development.

- Survey of identified badger setts within 50 m of either side of the construction works area boundary to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the period following the completion of construction.
- Surveys will be undertaken annually in Operational Years 1, 2, 3, 4 and 5.
- These surveys can be undertaken at any time of the year, but are most effective between November and April when vegetation cover is reduced. However, until mid-January, badgers are less active during colder weather and setts can appear less well-used (NRA, 2008).
- Results will be made available to the Local Authority and relevant statutory consultees in the form of an annual report.

References

- National Roads Authority (2005). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority, Dublin.
- National Roads Authority (2008). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.

RW-BPM-21 Best Practice Measure

Title:	**Disturbance and/or physical injury to Other Mammals**

Environmental Commitment

To avoid disturbance and/or physical injury to other mammals throughout the pre-construction, during construction and operational phases of the development.

Work Sections/Locations

All sections

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities.
Project Ecologist	• Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

Construction Stage Surveying

- Confirmatory surveys (of suitable habitat) for the presence/absence of these protected species or their breeding/resting places within 50m of the construction works area will be undertaken prior to the commencement of vegetation and/or hedgerow clearance and excavations.
- Confirmatory surveys to check for any new dens/dreys that may have arisen between the time of the original survey and start of works will be carried out by the Project Ecologist;
- The Project Ecologist will communicate all confirmatory survey results and information to the Project Team. This information will also be issued to the Local Authority and relevant statutory consultees, as agreed at the consenting stage.

Measures to avoid/minimise disturbance effects to pine martin

In the event of the confirmation of pine martin breeding/resting places specific measures will include:

- Marking exclusion zones around any confirmed pine marten dens;
- The boundary of the exclusion zone will be a minimum of 30m from a non-breeding den and at least 100m from dens which are known or suspected of being used for breeding,
- No construction works will be carried out within the exclusion zones in the breeding season (March-June inclusive);
- If construction works during the breeding season cannot be avoided, the den will be destroyed. The destruction of a den will require an NPWS Licence.

Measures to avoid/minimise disturbance effects to pine martin and red squirrel

In the event of the confirmation of red squirrel breeding/resting places specific measures will include:

- Marking 50m exclusion zones around any confirmed breeding red squirrel dreys;
- If monitoring confirms the drey is not used for breeding, smaller protection zones will be required (5m or to the nearest neighbouring tree);
- On-going survey of any dreys within 50m of works areas to monitor the breeding status of the drey, (red squirrels can move dreys during the breeding season, so a non-breeding drey could change status);
- Avoiding felling any trees containing red squirrel dreys, if unavoidable, the destruction of a red squirrel drey will require an NPWS licence.
- Where construction works will take place within 50m of a breeding drey, the works will be scheduled, if feasible, to take place between October–January inclusive (which is outside the breeding season), If this is unfeasible the potential for disturbance will be evaluated by the Project Ecologist and works will be monitored;

• Construction machinery will not exceed 20km/hour on access roads to ensure the protection of other non-volant mammals including but not limited to Irish hare, pine marten, hedgehog, red squirrel and Irish stoat.
Measures to avoid/minimise disturbance effects to Irish hare, hedgehog, Irish stoat, pine martin, red squirrel
• Construction machinery will not exceed 20km/hour on site access roads.
References
• Scottish Natural Heritage (2012). Protected Species Advice for Developers – Pine Marten. http://www.snh.gov.uk/docs/A1959323.pdf. • Scottish Natural Heritage (2012). Protected Species Advice for Developers – Red Squirrel. http://www.snh.gov.uk/docs/A1959329.pdf.

RW-BPM-22 Best Practice Measure

Title:	**Management of general non-native invasive species.**		

Environmental Commitment

To avoid the introduction, establishment and spread of non-native species to the proposed development site during the pre-construction, during construction and operational phase.

Work Sections/Locations

All sections

Responsibility of	**Role/Duty**
Construction Manager	• Requiring supply companies to clean delivery vehicles before entering the site to gain access to works area • Obtaining and keeping a record of delivery companies cleaning of vehicles • Training flagmen in the appropriate method of vehicle cleaning
Flagmen	• Cleaning of delivery vehicles exiting the site with suitable disinfectant • Maintaining a record of all vehicles cleaned and equipment, disinfectant used.
Project Ecologist	• Carrying out spot checks on flagmen during cleaning of delivery vehicles. • Must be aware of the best practice guidance listed in References below.

Inspection and Cleaning of Delivery Vehicles

- Prior to arrival on site, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water > 65 degrees C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. Virkon Aquatic).
- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. Given that Crayfish Plague has affected rivers in the area recently (2017) the level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site.
- The flagmen which will be present at each active site access points will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques.
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution.
- 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. Any attached or adherent material will be removed before entering or leaving the site of operation, securely stored away from traffic for removal to the waste storage area in the Temporary Compound at the end of the work day.
- No removed material or run-off will be allowed to enter a water body of any sort.
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually.
- Records of supplies and cleaning of delivery vehicles will be kept by the flagmen, and will be regularly inspected by the Environmental Clerk of Works.
- Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.

Measures at or in watercourses

- Residual water in any containers/vessels used in works near watercourses will be flushed with disinfectant (Virkon Aquatic) onto grass. A drying period of at least 24 hours will be adhered to.

- All footwear used, or to be used, in streams or rivers will be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards. This does not apply to footwear use in wetlands or peatland areas.
- Any observations of mass mortality of Crayfish will be reported to the relevant authorities within 1 hour of evidence being found.

Measures for white toothed shrew

- Consignments of organic materials, such as hedging material, will be inspected for presence of Greater White-toothed Shrew.

References

- http://www.fisheriesireland.ie/Research/invasive-species.html
- http://www.nonnativespecies.org/checkcleandry/

RW-BPM-23 Best Practice Measure

Title:	**Best practice methods to ensure the protection of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*).**

Environmental Commitment

To avoid effects on the breeding habitat of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*) if present along the UWF Related Works during the pre-construction and construction phase.

Work Sections/Locations

All construction works areas

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Must be aware of the locations of all previously identified habitats suitable for breeding amphibian along the works area. • Monitor the construction activities when working adjacent to amphibian breeding habitat to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

To avoid effects on the breeding habitat of common frog and smooth newt

- Should construction activities be scheduled for areas proximal to previously identified habitat suitable for breeding common frog or smooth newt during the species' respective breeding seasons (frogs: January-March and newts: March-May), confirmatory surveys following standardised methodologies will be carried out at those locations to confirm the presence/absence of breeding adults and/or spawn.
- If evidence of breeding frog or newts is confirmed proximal to the work locations, the areas will be fenced off with appropriate signage in order to protect these species during construction activities;
- Protecting the hydrological regime of the habitat is particularly important. Thus, it is particularly important that the Project Ecologist is suitably qualified so as to have a clear understanding of the drainage characteristics of wet areas such as ponds, pools and drains which have the potential to support breeding amphibians along the route to ensure that these areas are maintained into the future;
- Note: The proposed development is beyond the geographical range of the Natterjack toad (Bufo (Epidalea) calamita), thus this species does not require mitigation within this Project.

References

- National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.

RW-BPM-24 Best Practice Measure

Title:	**Best practice methods to ensure the protection of Viviparous lizard (*Lacerta (Zootoca) vivipara*)**

Environmental Commitment

To avoid effects on Viviparous lizard (*Lacerta (Zootoca) vivipara*) during the pre-construction and construction phase.

Work Sections/Locations

All sections

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

To avoid effects on Viviparous lizard.

- As Viviparous lizards are widespread in Ireland and can be found in a range of habitat types such as in bog, heath, the margins of coniferous woodlands, in addition to being common in a range of grassland habitats, particularly those not subject to heavy grazing pressure, a spot-check confirmatory survey by the Project Ecologist will be required within these habitats prior to the commencement of the construction stage to confirm the presence/absence of individuals.
- Capture and relocation operations for this species can be extremely labour-intensive and in most cases the most efficient approach is to cut down and rake-off vegetation during warm weather, with the intention of displacing the resident lizards prior to earthworks or other activities that could result in their incidental mortality (NRA, 2009). Whether or not reptile-proof fencing is then required to exclude the animals will need to be reviewed on a location-specific basis by the Project Ecologist.
- Note: The proposed development is beyond the geographical range of the non-native Slow-worm (Anguis fragilis), thus this species does not require mitigation within this Project.

References

- NRA (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.

RW-BPM-25 Best Practice Measure

Title:	**Measures to ensure the protection of Marsh Fritillary (*Euphydryas aurinia*)**

Environmental Commitment

To avoid effects on Marsh Fritillary / Marsh Fritillary habitat during the pre-construction and construction phase.

Work Sections/Locations

UWF Related Works: SW13 and other suitable habitat within 50m of construction works areas.

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Carrying out of Confirmatory Survey of suitable habitat • Monitor the construction works when working adjacent to Marsh Fritillary habitat to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

Pre-Construction Surveying measures for Marsh Fritillary

- Confirmatory survey of the distribution of Devil's-bit Scabious (larval food plant of Marsh Fritillary) (project design measure)
- The survey will be carried out during the last available April prior to the commencement of construction in suitable habitat within 50m of the construction works area
- Surveys will be completed within 12 months prior to the commencement of the construction stage, within the correct seasonal period as per Best Practice.

Measures for the protection of Marsh Fritillary at different times of their life-cycle

- Any areas of Devil's-bit Scabious that are located within the construction works area boundary, will be strimmed/cut to ground level in the last available late April / early May period prior to the commencement of construction (project design measure).

Post-Construction Surveying measures for Marsh Fritillary

- Survey all areas with identified Marsh Fritillary colonies within the correct seasonal period annually, in years 1, 2, 3 of operation as per Best Practice,
- Surveying will monitor the status of Marsh Fritillary colonies and record any change to baseline trends as a result of the development of the UWF Related Works.
- Results will be made available to the Local Authority and relevant statutory consultees, in the form of an annual report.

References

- National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.

RW-BPM-26 Best Practice Measure	
Title:	**Local Employment and Local Sourcing**
Environmental Commitment	
Where feasible, to source contracts, materials and workforce locally during the construction stage of the UWF Related Works	
Responsibility of	**Role/Duty**
Construction Manager	• Where possible, to operate a local bias when recruiting employees and sourcing materials. • Develop a Local Employment and Local Sourcing Policy
Community Liaison Officer (CLO)	• Management of local employment and resources database • Engage with service businesses in the area ahead of construction works • Monitor the recruitment and training of local employees in line with Policy
Increasing potential for local sourcing and local employment	
• Contact local business ahead of works and contracts being awarded, so that the main contactors are aware of the services and materials available locally • Management of local employment and resources database • Engage with service businesses in the area ahead of construction works • Monitor the recruitment and training of local employees in line with Policy	

RW-BPM-27 Best Practice Measure

Title:	**Landowner and Land-user Liaison**

Environmental Commitment

To keep landowners up-to-date with relevant construction works

Work Sections/Locations

All works locations on agricultural and forestry lands

Responsibility of	**Role/Duty**
Construction Manager	• To provide accurate information to the Community Liaison Officer regarding construction schedules • To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer
Community Liaison Officer	• To manage the interests of the Owner at all times with regard to landowner issues • To lead the day-to-day communication with landowners • To be available and accessible to landowners • To inform, advise, assist landowners and to communicate with the contractor on behalf of the landowner or user • To oversee the resolution of any issues in relation to landowners • Manage the coordination of land restoration works • Assist the Project Manager in the completion of snag lists and the works area boundaries following reinstatement.
Environmental Clerk of Works	• To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer

Landowner and Land-User Liaison Measures

- Landowners will be engaged with early and ahead of works
- A telephone number for the Landowner Liaison Officer will be provided
- Good mapping and an explanation of the mapping will be provided
- Landowners will be contacted ahead of works taking place on their lands
- Landowners will be dealt with honestly and fairly
- Queries from landowners will be dealt with promptly and courteously
- Restrictions to lands during construction will be minimised and access points to interconnected lands, including walking routes, will be provided
- Local walking groups or other land users will be kept up-to-date with the construction works schedule
- Any works in close proximity or crossing a waymarked trail will not be scheduled during the same period as a walking festival or event

References

- Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP)

RW-BPM-28 Best Practice Measure

Title:	**Minimising Disturbance and Damage to Land**

Environmental Commitment

To minimise disturbance to and damage of agricultural and forestry lands

Work Sections/Locations

All works areas

Responsibility of	**Role/Duty**
Construction Manager	• To fence all active construction works areas
Community Liaison Officer	• Manage the interests of the Project Promoter at all times with regard to landowner issues • Lead the day-to-day communication with landowners • Supervise the fencing of lands • Manage the coordination of land restoration works in accordance with RW-OCM-14: Reinstatement of Land • Assist the Project Manager in the completion of snag lists and the of works area boundaries following reinstatement.
Environmental Clerk of Works	• To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer

Minimising Disturbance and Damage to Land Measures

- Landowners will be contacted ahead of works taking place on their lands
- Construction works areas will be fenced ahead of works on a landholding
- All location of livestock supply underground water pipes will be confirmed prior to works, care will be taken in these are not to damage water pipes or wells and to ensure that supply is not interrupted
- Construction personnel will only enter on lands to carry out authorised works
- Construction personnel will take due care and attention to minimise damage to land or livestock
- All works, storage of overburden and materials will take place within the construction works area boundaries. Construction related vehicles will travel within the work areas (Project Design Measure)
- All ditches, open drains or watercourses interfered with by the works will be maintained in effective condition during construction and finally restored to as good (or better) condition as before the commencement of works
- Lands under construction works areas will be left in as good (or better) condition than before works began
- Restrictions to lands during construction will be minimised and access points to interconnected lands will be provided

References

- Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP)

RW-BPM-29 Best Practice Measure

Title:	**Minimising Dust Emissions From Site Activities**

Environmental Commitment

Minimise dust emissions from site activities

Work Sections/Locations

All construction works locations

Responsibility of	**Role/Duty**
Construction Manager	• Provide site induction to site personnel and contractors regarding the dust control measures

Training and Communication

- Provide site induction to site personnel and contractors regarding the dust control measures
- Community engagement before works commence will be carried out.
- The name and contact details of the Community Liaison Officer and Environmental Clerk of Works will be displayed on the informational signage at the Site Compound No.1. The CLO and the ECoW will be the point of contact regarding air quality and dust issues.

Measures to minimize dust emissions

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that is likely to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.
- During movement of materials both on and off-site, trucks will be covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected by a visual inspection by a competent person to ensure no potential for dust emissions. If dust potential exists it will be mitigated using the appropriate measures such as wheel washing or covering of materials.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Materials will be adequately covered, especially if being stored for long periods of time to prevent dust emissions primarily during dry or windy periods.
- Permanent stockpiles of soils will be reseeded as soon as practical following placement.
- If dust issues start to occur, refer to 'Guidance on the Assessment of Dust from Demolition and Construction' for additional measures put in place to avoid any significant impacts.
- Provide site induction to site personnel and contractors regarding the dust control measures

References

- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII, 2011)
- Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)

RW-BPM-30 Best Practice Measure

Title:	**Traffic Management Measures**

Environmental Commitment

Manage traffic to ensure that construction traffic will travel safely and efficiently along the public road network.

Responsibilities

Project Manager	• Consult with Tipperary County Council • Consult with Gardaí • Contractor arrangements regarding speed limits, alert beacons, haulage routes etc. • Oversee the implementation of the Traffic Management Plan
Construction Manager	• Install information, direction and warning signage in advance of road works, site entrances and along haul routes • Implement the Traffic Management Plan
Environmental Clerk of Works	• Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures
Community Liaison Officer	• Act as point of contact with local community, • Keep the local community informed of construction and road works in their area

Traffic Management Measure

Communication and Information

- The Project Manager will keep in contact with Tipperary County Council Roads Section, with a view keeping the Roads Section informed of up to date activities and to avoid any conflicting concurrent works and/or diversions that the Local Authority may have planned at the time of construction;
- Ahead of works in an area, the Community Liaison Officer will inform local residents of the construction and delivery schedule. Residents will also receive a leaflet with an overview of the traffic schedule and the contact information for both the Community Liaison Officer and the Environmental Clerk of Works so that householders and local farmers can make enquiries to levels of usage and provide information on local events or work/activities which may conflict with the construction/delivery schedules.
- The Construction Manager will erect an information sign at the Site Compound No.1 site entrance. This sign will give an overview of the construction traffic timetable; the contact numbers for the Environmental Clerk of Works and the Community Liaison Officer, and will serve as an advance warning to expect construction traffic on the road.
- Directional signage will be installed at specific locations along the haul routes. The haul routes for construction material deliveries to the UWF Related Works will have clear directional signage from the R503 to the temporary site entrances, and this signage will be relocated to indicate the location of the UWF Related Works as the works progresses.
- Advance warning signage will be erected on both approaches to temporary site entrance locations and road works locations. The placement of this signage will be based on the recorded 85th percentile traffic speeds, or the posted limit, whichever is the higher.

Measures for Delivery Personnel

- These Traffic Management Measures will be part of the induction to all haulage companies delivering to site.
- All machinery entering the site will have working rotating beacons and these beacons will be activated to indicate to other traffic of their intention to enter or exit the site.
- All companies delivering aggregate, concrete or other materials to works areas will be instructed to use the designated haul routes and will be informed of designated delivery hours for routine deliveries.

- A speed limit of 50km/hr on the Local Roads between the R503 and R497 and the site entrances will be implemented and communicated to the companies delivering materials to site.
- All material deliveries will have a maximum axle load of 12 tonnes per axle.

Measures for Site Personnel

- A speed limit of 50km/hr will be implemented and communicated to the personnel travelling on the Local Roads between the Site Compound No.1 and the temporary site entrances.
- There will be onsite parking for all construction personnel at the Site Compound No.1.
- There will be no parking of any vehicles on the public road.

Protection of the Public Road Network from Surface water run-off

- To ensure that surface water run-off does not flow onto the public road surface, a concealed drain will be provided parallel to the public road network at the Site Compound No.1.

Measures for Local Residents

- All construction works will be carried out during daylight hours **(Project Design Measure).**
- Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a safe and efficient manner **(Project Design Measure).**
- With the exception of Baurnadomeeny, local access will be facilitated to properties at all times during the construction works on the public road network. No entrances will be blocked and flagmen will used to organise through traffic in the event of the public carriageway being temporarily obstructed.
- Construction works in Knockmaroe and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as Upperchurch Windfarm **(Project Design Measure).**

Measures to minimize debris on road

- In order to minimize mud and debris deposited on roadway surfaces there will be a dry wheel wash facility positioned at the site entrance for the Site Compound No. 1 and will be used by trucks exiting the site.
- In addition to this a road sweeper will operate at all site entrances, as required, for the duration of the construction of the UWF Related Works and in particular, during the importation of aggregates and concrete.
- The road sweeper will keep the roads at sites entrances clean and clear of mud and debris

Road Repair and Reinstatement

- Following the completion of construction works, all road boundaries at temporary site access points or at temporary road widening locations will be reinstated along the existing alignment.
- Following road works for cable trenching, road pavements will be reinstated in accordance with the Tii Guidelines on the Opening, Backfilling and Reinstatement of Openings in Public Roads,
- Where the cables trench crosses perpendicular to the road, full width surface overlay to a distance of 5m beyond either side of the trench will be carried out. Where the cables are aligned along the length of the road, full-width surface overlay will be carried out on any sections of road where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250.
- Along construction materials haulage routes, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken along the routes of concentrated construction traffic between the R503 and the site entrances on the local road network. Whilst it is not expected to occur, any damage to structures or road pavements will be repaired to at least as good a condition as pre-works, and on damaged sections of roads where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250, full-width surface overlay will be carried out.
- Any road repairs if required following the end of the construction stage will be by arrangement with Tipperary County Council.

References

- Department of Transport - Traffic Signs Manual: Chapter 8 - Temporary Traffic Measures and Signs for Roadworks of the Department of Transport, Tourism and Sport Traffic Signs Manual, November 2015
- Opening, Backfilling and Reinstatement of Openings in Public Roads (Transport Infrastructure Ireland, September 2015)

RW-BPM-31 Best Practice Measure	
Title:	**Measuring Operational EMF Emissions**
Environmental Commitment	
Work Sections/Locations	
Internal Windfarm Cabling	
Responsibility of	**Role/Duty**
Operational Manager – UWF	• Ensure operational EMF emissions are measured
Measuring Operational EMF Emissions	
• A confirmatory survey of Electromagnetic Field emissions from locations along the Internal Windfarm Cabling will be carried out by a competent engineer. The locations along the Internal Windfarm Cabling will include the following 9 No. local road crossings in Knockmaroe/Knockcurraghbola Crownlands, Knockcurraghbola Commons and Foilnaman. • Reporting by the competent engineer of the compliance of operational EMF emission levels with the levels predicted in the Revised EIA Report (2019).	
References	
• UWF Related Works Revised EIA Report (2019)	

RW-BPM-32 Best Practice Measure	
Title:	**Measuring Operational Electricity Production**
Environmental Commitment	
Work Sections/Locations	
Consented Upperchurch Windfarm Substation	
Responsibility of	**Role/Duty**
Operational Manager – UWF	• Record annual electricity production levels
Measures to minimize dust emissions	
• Recording and reporting of the annual renewable electricity production of the operational UWF.	
References	
• UWF Related Works Revised EIA Report (2019)	

UWF RELATED WORKS

VOLUME D
REVISED ENVIRONMENTAL MANAGEMENT PLAN

Tab 8
Outline Construction Methodologies for the UWF Related Works

ECOPOWER

January 2019

Outline Construction Methodologies for the UWF Related Works

The Outline Construction Methodologies for all of the main works and activities of UWF Related Works are presented below. The final Method Statements, which will be developed by the appointed Contractor prior to the commencement of the construction stage, will be based on these Outline Construction Methodologies.

All Outline Construction Methodologies (OCMs) for UWF Related Works are listed in Table 1 and then presented individually.

Table 1: List of Outline Construction Methodologies for the UWF Related Works

OCM Ref:	OCM Title	
RW-OCM-01	Pre-Construction Activities	
RW-OCM-02	Construction Works Area Preparation	
RW-OCM-03	Temporary Site Entrances	
RW-OCM-04	Realigned Windfarm Roads	
RW-OCM-05	Temporary Access Roads	
RW-OCM-06	Haul Route Works	
RW-OCM-07	Telecom Relay Pole	
RW-OCM-08	Internal Windfarm Cabling	
RW-OCM-09	Instream Works Preparation and Reinstatement	
RW-OCM-10	Instream Works	
RW-OCM-11	Bailey Bridge Installation	
RW-OCM-12	Upgrading Existing Private Roads to Windfarm Access Roads	
RW-OCM-13	Overburden Storage Berms	
RW-OCM-14	Reinstatement of Land	
RW-OCM-15	Internal Windfarm Cabling - Cable Pulling & Jointing	
RW-OCM-16	Forestry Felling	

Outline Construction Methodology			
Title:	**Pre-Construction Activities**	**Ref:**	**RW-OCM-01**

General Description

Certain activities, will take place prior to the commencement of the main construction stage of the Windfarm Related Works, these include detailed design, management appointments and confirmatory surveys.

Duration

- Over a 6 month period prior to the commencement of the main construction stage

Personnel, Machinery & Equipment	**Materials**
• Main Contractor • Project Manager • Environmental Clerk of Works • Site Ecologist • Site Hydrologist	• Survey equipment

Standard Design and Management Activities:

1. The Project Manager, Main Contractor, and the Environmental Clerk of Works will be appointed.
2. The Environmental Management Plan will be reviewed by the appointees and updated to form the Construction Environmental Management Plan which will include planning permission details and conditions, the identification of key project personnel and the addition of the Contractors method statements.
3. The Traffic Management Plan will be updated with details of other road works, road maintenance or traffic diversions etc. that might be planned for the area at the same time as the construction works. This information will be obtained from the Roads Department of Tipperary County Council. The updated Traffic Management Plan will be submitted, along with road opening license applications, to the Roads Department of Tipperary County Council.
4. Method statements will be prepared by the Contractor. These method statements will be based on the Outline Construction Methodologies.
5. Pre-construction monitoring and confirmatory surveys will be carried out by specialist engineering and environmental consultants.

Pre-Construction Windfarm Monitoring Activities:

1. Road condition monitoring surveys, the first of which will take place prior to the commencement of construction activities.
2. Pre-construction water quality monitoring surveys, will be carried out
3. Pre-construction ecological confirmatory surveys.

End

Outline Construction Methodology			
Title:	**Construction Works Area Preparation**	**Ref:**	**RW-OCM-02**

General Description

Ahead of construction works in any particular area, the works areas will be set out before construction machinery enters onto the lands.

Duration

1 day per works area.

Personnel	**Materials Machinery & Equipment**
• Site engineer 2 civil works personnel	• Hand tools • GPS Equipment • Fencing posts • Fencing wire • Marker Tape • Portable electric fencer • Goal posts • Signage • Wooden pegs • 4 x 4 vehicle and trailer

Standard Methods:

4. Construction areas will be set-out using GPS and other surveying equipment.
5. The boundary of the construction areas will be marked and fenced with posts and wire or with electric fences if there is livestock present.
6. The boundaries of any archaeological, ecological or environmental buffer zones, such as buffer zones around watercourses, will be fenced off to prevent unauthorised access by construction crews, plant and machinery.
7. Confirmatory consultations with Irish Water, Eir and ESB and confirmatory ground surveys at service locations will be carried out ahead of works; 'Goal Posts' will be used to identify and highlight the height of nearby overhead lines; and a foreman will look out for underground pipes during excavations near services.

Pre-construction survey of the distribution of Devil's-bit Scabious (larval food plant of Marsh Fritillary) during the last available April prior to the commencement of construction works. This requires that any areas of Devil's-bit Scabious that are located within the construction works area boundary, will be strimmed/cut to ground level in the last available late April / early May period prior to the commencement of construction.

End

Outline Construction Methodology			
Title:	**Temporary Site Entrances**	**Ref:**	**RW-OCM-03**

General Description

Temporary site entrances from the public road network will be opened at haul route works locations in Knockcurraghbola Commons, Gleninchnaveigh, Grousehall, Knockmaroe, Foilnaman and Shevry and at locations where the windfarm internal cables cross the public road to facilitate the construction of the Internal Windfarm Cabling and Haul Route Works. These site entrances will be reinstated following the completion of construction works

Duration

- Half day to one day per entrance

Personnel, Machinery & Equipment	**Materials**
• Crew size: 3 operatives • Wheeled dumper or Track dumper • Vibrating Roller • 360˚ tracked excavator • Chains / hand tools • Chainsaw/Hedge Trimmers • Traffic management signage • Traffic Flagmen	• 50mm crushed stone • Geotextile matting • Granular fill • Gates • Timber posts • Rail fence • Wire fencing mesh • Silt fence • Timber Bog Mats / Aluminium Panel Tracks (where required) • Precast concrete culverts

Standard Methods

1. Prior to works at the entrances commencing, traffic management controls will be put in place and flagmen deployed. The roadside hedgerows at site entrances will be cut back or cleared where required to increase visibility when entering / exiting.
2. Temporary fencing will be erected and boundary wire mesh fencing will be used to improve visibility if necessary.
3. The roadside verge will be excavated down to a suitable formation level. Excavated material will be stored in berms along the construction works areas. These berms will be constructed as per RW-OCM-14 Overburden Storage Berms.
4. A base layer of stone, followed by a final layer of capping stone will be laid over the excavated verge. A vibrating roller will be used to compact each layer.
5. The final capping layer will be profiled to the existing road surface level and will provide a suitable surface for trucks delivering turbine components etc. to pass over.
6. Existing drainage channels will be kept clean at all times. Where required, they will be piped in culverts to maintain the existing flows.
7. Silt traps will be located along drains to stop suspended sediment from entering waterways.
8. .

9. Once the requirement for the temporary site entrance ceases, the stone will be removed, and the previously excavated material will be used to reinstate the works area. The roadside boundary will be reinstated along its original alignment and roadside drainage will be reinstated

Relevant Drawings from Volume C3 EIAR Figures

Figure RW 5.27: Cross Section of Hedgerow Removal and Reinstatement

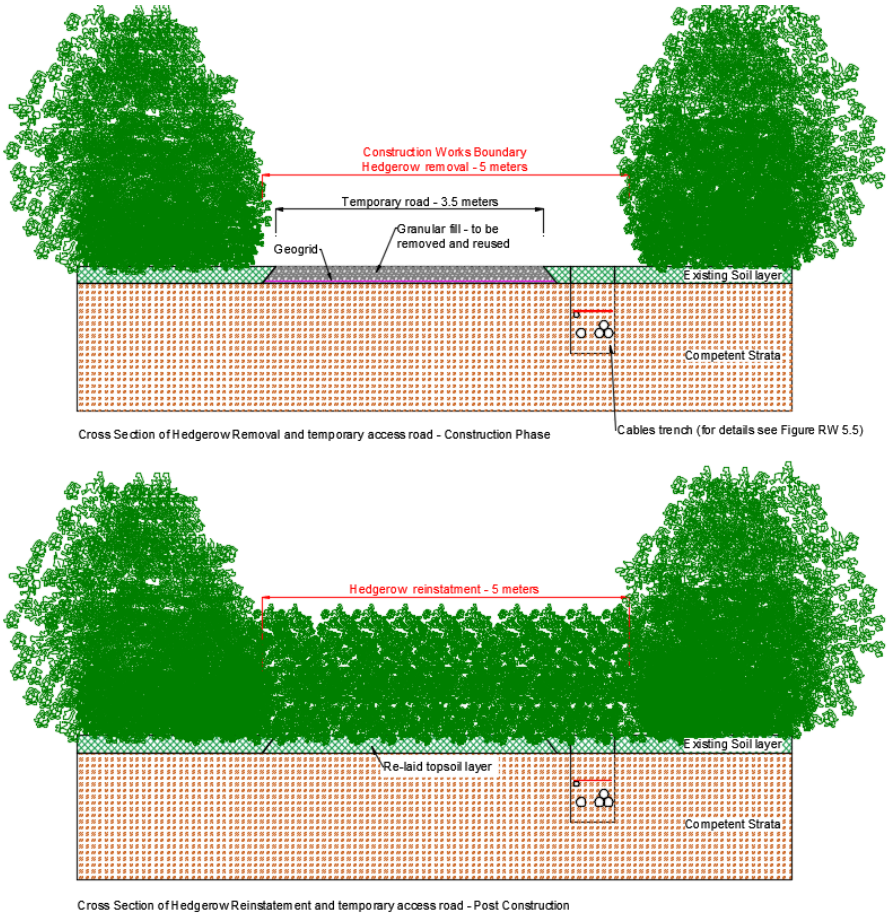
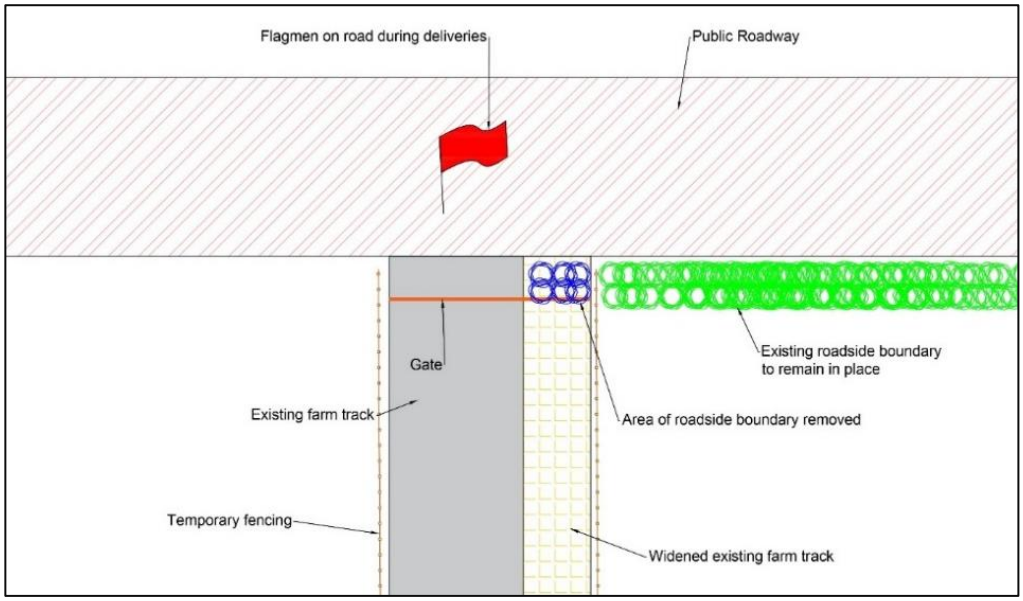


Figure RW 5.14: Plan View of Typical Temporary Site Entrance


Flagmen on road during deliveries
Public Roadway
Gate
Existing roadside boundary
to remain in place
Existing farm track
Area of roadside boundary removed
Temporary fencing
Widened existing farm track

End

Outline Construction Methodology			
Title:	**Realigned Windfarm Roads**	**Ref:**	**RW-OCM-04**

General Description

The Upperchurch Windfarm Access Roads require realigning at three locations; RWR1, RWR2 and RWR3 as follows:

RWR1: The Upperchurch Windfarm access road to Turbine No.5 in Shevry is 560m in length, and it is proposed to replace this road in its entirety with the Realigned Windfarm Road RWR1, which will be 230m in length.

RWR2: The Upperchurch Windfarm access road between Turbine No.19 and Turbines No.20 & No.21, is 840m long in total. It is proposed to replace 370m of this road with the Realigned Windfarm Road RWR2, which will also be 370m in length.

RWR3: A short length (30m) of new access road is proposed between the Upperchurch Windfarm Access Roads in Knockmaroe to the new Telecom Relay Pole.

Duration

Site Specific, c.100m/day

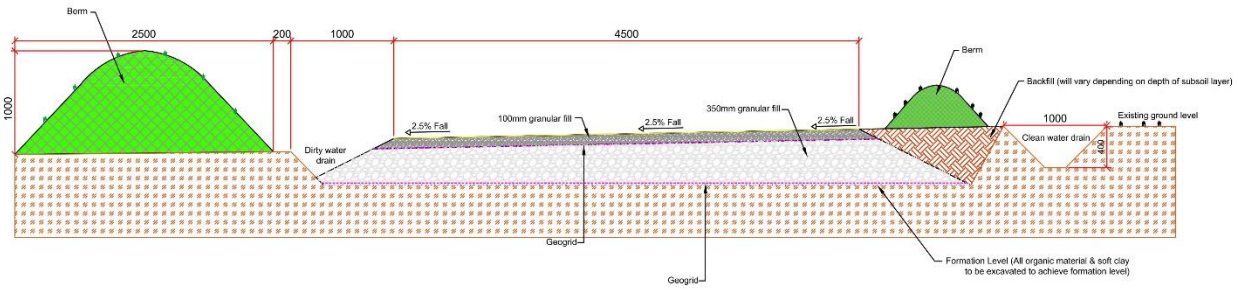
Personnel, Machinery & Equipment	**Materials**
• Crew size: 4 operatives • Site engineer • Site Ecologist • Wheeled or tracked dumper • 360˚ tracked excavator • Vibrating Roller • Tree harvester • Timber trucks	• 50mm crushed stone • Granular fill • Geotextile matting • Wooden pegs • Wooden posts • Fencing wire/tape

Standard Methods

1. The route of the Realigned Windfarm Roads will be marked out using GPS equipment and wooden pegs by the site engineer.
2. The boundary of the construction areas will be will fenced with wooden posts and wire or with electric fences if there is livestock present, and the boundaries of any archaeological, ecological or environmental buffer zones, such as buffer zones around watercourses, will be fenced off with marker tape to prevent unauthorised access by construction crews, plant and machinery.
3. A corridor of forestry approx. 10m in width and 230m long will be felled at RWR1. The trees will be cut and de-limbed using a forestry harvester machine. The harvester will cut the trees in various length assortments as required. Once cut a timber forwarder machine will extract the timber from the felling area and will stack the timber adjacent to the roadside for collection by timber trucks. The remaining brash will be baled and removed from site for chipping.
4. An excavator will remove any organic material and topsoil from a 4.5m wide route along the path of the Realigned Windfarm Roads to formation level. The excavated material will be stored in berms alongside the new road. Roadside drainage channels will be cut at each side of the proposed road.
5. Geotextile matting will be laid out where necessary (subject to site conditions).
6. A minimum sub-base will be laid which will consist of 350mm deep layer of 50mm crushed stone.
7. A surface layer will be laid which will consist of 100mm compacted granular fill to accommodate HGV traffic.
8. A vibrating roller will compact the stone in layers.
9. The surface of the new road will be finished with a 1% gradient to allow water run-off.

Relevant Drawings from Volume C3 EIAR Figures

Figure RW 5.8: Cross Section of Realigned Windfarm Road



End

Outline Construction Methodology			
Title:	**Temporary Access Roads**	**Ref:**	**RW-OCM-05**

General Description

Temporary access roads will provide access to off-road construction work locations and will be circa 3.5m in width.

Duration

- Site specific, c.150m length per day

Personnel, Machinery & Equipment	
• Site Engineer • Crew size: 3 operatives • 1 Excavator Operator	• Wooden pegs • 50mm Crushed Stone • Geotextile matting • Plastic Mats / Aluminium Panel Tracks • Pre-cast culverts • Vibrating roller

Standard Methods (based on a 3.5m wide stone road)

1. The alignment of the temporary road will be marked out with pegs by the site engineer.
2. The excavator will first remove the topsoil/vegetation layer and will temporarily store this material in berms beside the construction works corridor as per RW-OCM-14: Overburden Storage Berms, for later use during reinstatement works along the footprint of the temporary access road.
3. The depth and width of topsoil removal will be kept to a minimum.
4. A layer of geotextile material will be laid over the excavated ground.
5. A layer of 200mm deep of 50mm stone will then be overlaid on the geotextile and compacted in layers using a vibrating roller.
6. Reinstatement will take place when the works necessitating the temporary road have been completed.
7. The layer of stone and geogrid will be removed and either re-used to form a further section of temporary road or disposed of to a licensed landfill. The area will be reinstated using the soil from the berm adjacent to the road, which will be reseeded.

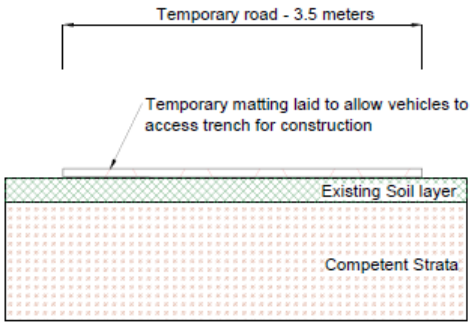
Standard Methods (based on a 3.5m wide using aluminum / plastic matting)

1. The alignment of the temporary road will be marked out with wooden pegs by the site engineer.
2. Plastic / Aluminium mats will be laid along the marked route.
3. When the works necessitating the temporary road have been completed. The matting will be taken up and either re-used to form a further section of temporary road or disposed of to a licensed landfill.

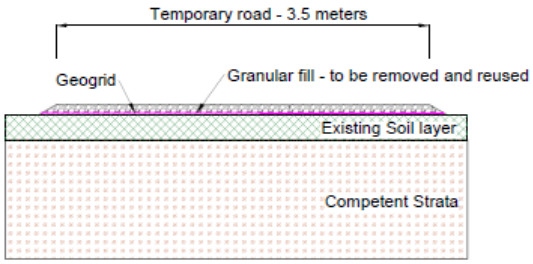
	**Temporary Aluminium Panel Tracks**

Relevant Drawings from Volume C3 EIAR Figures

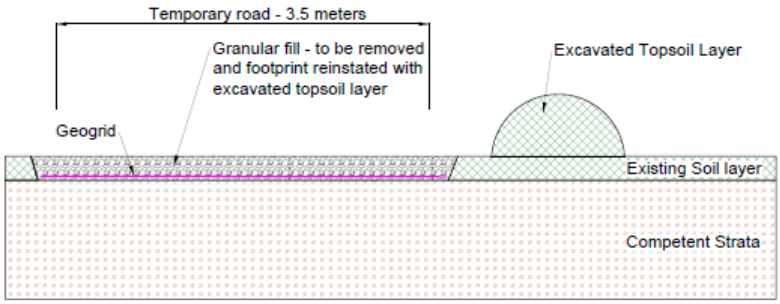
Figure RW 5.15: Cross Section of Temporary Access Roads



Cross Section of temporary access road - Matting



Cross Section of temporary access road - Floating road



Cross Section of temporary access road - cut and fill

End

Outline Construction Methodology			
Title:	**Haul Route Works**	**Ref:**	**RW-OCM-06**

General Description

Works will be required along the haul route to widen the road in order to accommodate the trucks and trailers delivering turbine components to the site and to widen bends along the haul route where the bends are too acute to cater for the abnormal long loads associated with the transport of turbine blades and towers. Temporary roads over private lands will also need to be constructed and some telephone poles will need to be relocated.

Duration

- It will take 2 crews, 4 weeks to complete the works

Personnel, Machinery & Equipment	**Materials**
• Site Engineer • 2 tracked excavators • Dumper truck • Hedge cutter mounted on tractor • Mobile hoists • Chainsaws • Vibrating roller • 1 No. JCB mounted auger drill	• Wooden pegs • Geotextile • Signage sockets • Traffic management signage • Aluminum / plastic mats • 50mm crushed stone • Telephone poles

Standard Methods for Road Widening into the Verge and Roadside Boundary

1. Traffic management protocols will be put in place before any works commence.
2. Where a section of the haul route or an acute bend along the haul route is required to be widened, the verge and bank will be removed. The excavated soil will be then used to construct a new bank, adjacent to the works area, at a set-back distance sufficient to allow the turbine component traffic to pass along the widened part of the roadway unhindered.
3. A tractor mounted hedge trimmer will be used to prune the roadside hedges where required. Trees will be removed, if required, using chainsaws and mobile hoists.
4. A layer of 50mm stone will then be placed and compacted to road level in the excavated verge/boundary area.
5. Once the turbine deliveries are complete the widened roadway will be reinstated by the replacement of the verges and/or boundary bank/hedgerow or the erection of a post and rail fence along the original roadway verge/boundary line. The roadside drainage system will also be reinstated following completion of the turbine component deliveries.

If, in the operational phase of Upperchurch Windfarm, a large component e.g. a blade or tower, is required to be delivered to site, the fence/boundary will be taken down or removed once more to facilitate the transportation, and will be reinstated immediately afterwards.

Standard Methods for Temporary Road Construction from the Public Road into Private Lands

1. Traffic management protocols will be put in place before any works commence
2. The public road will be widened into the verge and the roadside boundary removed to provide an access point to the new temporary road.

3. The alignment of the temporary road will be marked out with wooden pegs by the site engineer.
4. The excavator will first remove the topsoil/vegetation layer and will temporarily store this material in berms along the construction works corridor as per RW.OCM-14: Overburden Storage Berms, for later use during reinstatement works along the footprint of the temporary access road.
5. The depth and width of topsoil removal will be kept to a minimum.
6. A layer of geotextile material will be laid over the excavated ground.
7. 50mm crushed stone will then be overlaid on the geotextile and compacted in layers using a vibrating roller until a suitably strong road is formed.
8. Reinstatement will take place when the transport of the turbine components has been completed. The area will be reinstated using the soil from the berm adjacent to the road, which will be reseeded.
9. If any compaction of the subsoil is evident following completion of works, a subsoil plough will be used to loosen the subsoil layer.
10. If, during the operational phase of Upperchurch Windfarm, a large component e.g. a blade or tower, is required to be transported to the site, as it is likely to be only a single load, the reinstated area will be only need to be covered with geogrid and aluminium or plastic matting placed on top, which will enable the delivery of the component without any requirement for excavation works.

Standard Methods for Relocation of Telephone Poles

1. Any telephone poles that are located within footprint of the widened haul route will need to be relocated.
2. The telephone wires or lines will be disconnected from the telephone network.
3. The telephone wire or lines will be disconnected from the pole.
4. The pole will then be cut down using a chainsaw and will be removed from the site.
5. A 2m deep hole will be auger drilled using a JCB mounted auger drill at a nearby suitable location but outside of the haul route footprint.
6. The pole will be inserted into the hole and backfill will be compacted in layers around the pole to fasten it in and make secure.
7. Once the pole is secured the telephone line will be attached to the new repositioned pole.
8. The line can then be re-connected to the telephone network.

End

Outline Construction Methodology			
Title:	**Telecom Relay Pole**	**Ref:**	**RW-OCM-07**

General Description

A Telecom Relay Pole, up to 18m in height, which will support the installation of telecoms relay dishes, which will be used to relay telecoms signals around Upperchurch Windfarm in the event that the consented UWF wind turbines interfere with the existing telecoms signals. The Telecom Relay Pole will be erected in a secure compound, which will be 5m x 5m (25m^2) in area.

Duration

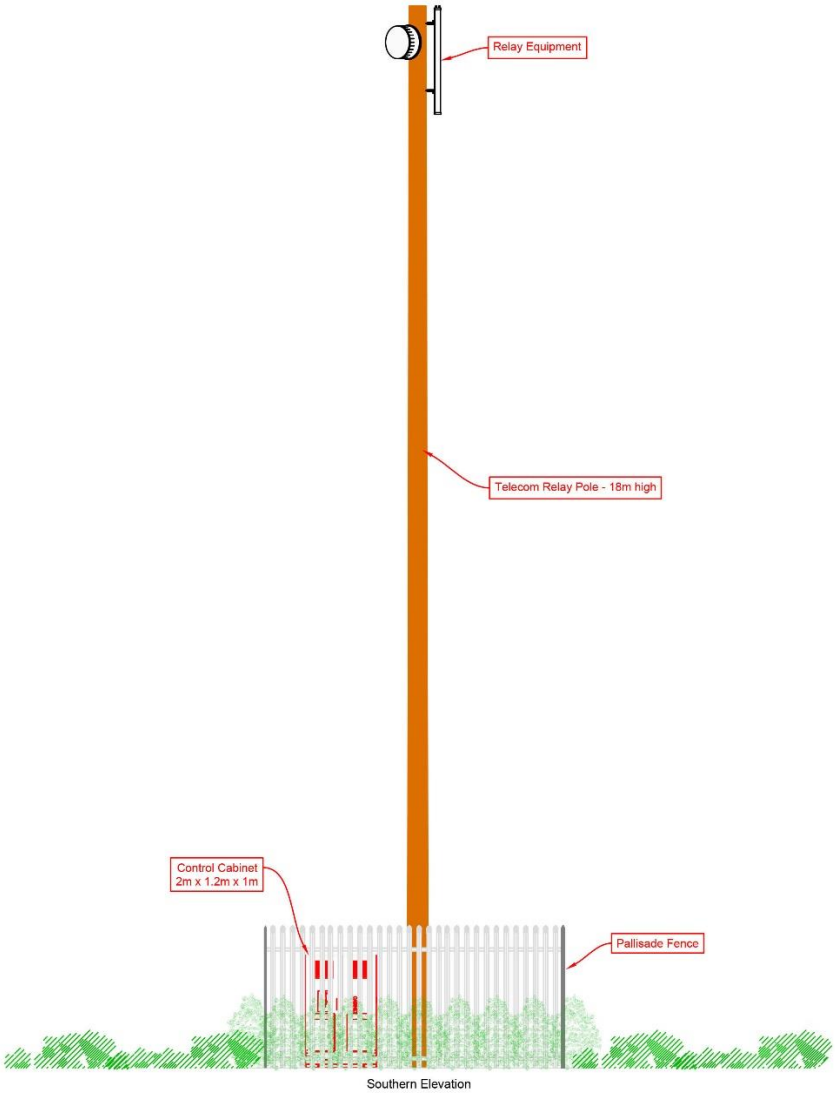
- 2 days

Personnel, Machinery & Equipment	Materials
• 3 No. installation crew • 1 No. JCB mounted auger drill • Mobile hoist • 1 Excavator • Vibrating roller •	• 1 No. 20m wooden pole • 50mm Crushed Stone • Telecoms dishes (Receivers and Transmitters) • Underground electrical cable and connection equipment • Ground equipment • Native grass, heather, tree and hedgerow species – seeds/seedlings

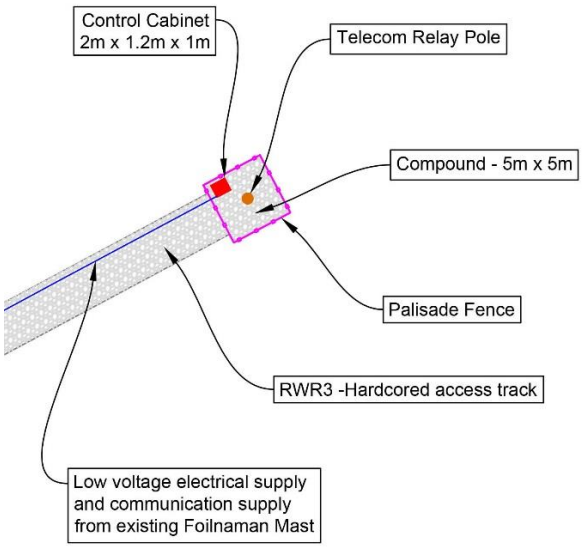
Standard Methods

1. The location of the Telecom Relay Pole and 5m x 5m compound area will be pegged out.
2. Topsoil will be excavated from the footprint of the compound area and stored in an adjacent berm.
3. A layer of 50mm crushed stone will be overlaid and compacted on the compound area.
4. A 2m deep hole will be auger drilled at the Telecom Relay Pole proposed location in the centre of the compound.
5. The pole will be inserted into the hole and backfill will be compacted in layers around the pole to fasten it in and make secure.
6. An underground electrical cable to provide electrical power from the existing Foilnaman Mast to the relay equipment will be installed.
7. Telecoms dishes will be installed on the pole which will allow any telecom signals affected by the wind turbines to be redirected away from the turbines to/from the Foilnaman Mast, thus avoiding any interference with the signals.
8. Secure palisade fencing with an entrance gate will be erected around the compound
9. Ground equipment will be installed, and connections between the Telecoms Relay Pole and the existing Foilnaman Masts will be commissioned.
10. A low hedgerow, comprising native tree and shrub species will be planted around the compound
11. The overburden storage berm will be seeded with native grass species.

Relevant Volume C3 EIAR Figures:
Figure RW 5.12: Plan and Elevation of Telecom Relay Pole and Compound



Southern Elevation



End

Outline Construction Methodology

Title:	**Internal Windfarm Cabling**	**Ref:**	**RW-OCM-08**

General Description

Internal Windfarm Cabling will comprise c.17.9km of trenching, laid with ducts which will house 33kV electrical cables and communications cables and will connect the Consented UWF Turbines to the Consented UWF Substation. The cables trench will be 1.25m deep and 0.6m wide. Above ground identification marker posts and plates will be positioned to mark the location of the underground cables. The design of Internal Windfarm Cabling is typical of medium voltage windfarm cabling systems.

Duration

- Approx. 100m per crew per day, Circa 3 months in total

Personnel, Machinery & Equipment	**Materials**
• Three crews of 2-3 general operatives and 1 excavator operator per crew • Archaeologist • 3 No. Wheeled dumper or Track dumpers (6 to 8 tons) • 3 No. 360˚ tracked excavators • Brush & mandrel • Cable winch	• 125mm diameter uPVC ducting • Red cable marker strip • Yellow marker warning tape • Marker Plates and Posts • Road surfacing material • Granular fill • silt fenceing

Standard Methods: Installing cable ducting.

1. The cable trench will be excavated to a distance of circa 50m ahead of the ducting works. Once the ducting is installed the trench will be backfilled so that only circa 100m of trench is open per crew at any one time along the cable route.
2. The trench floor will be graded, smoothed and trimmed when the required 1250mm depth and 600mm width have been obtained.
3. Excavated material will be stored close to the trench within the construction works area boundary and utilised throughout the works for backfilling and reinstatement purposes.
4. Three ducts, through which the electrical cables will be pulled, will be installed by hand in trefoil formation as detailed on the design drawings. Spacers will be used as appropriate to establish horizontal duct spacing.
5. When installed, the ducts will be surrounded and covered with the suitable backfill from the excavated material which will be compacted in layers.
6. Red cable marker strips will be placed on the compacted backfill directly over the bottom row of ducts which will contain the electrical cables.
7. The top duct, through which the fibre optic cable will be pulled, will then be installed by hand onto the compacted backfill.
8. The top duct will then be surrounded and covered with backfill material, in accordance with the drawings, and compacted.
9. Another layer of red cable protection strip will be placed on top of the compacted backfill.
10. The backfill will then be laid to within 300mm of the ground surface and compacted.
11. Yellow warning tape, will be placed over the compacted backfill.

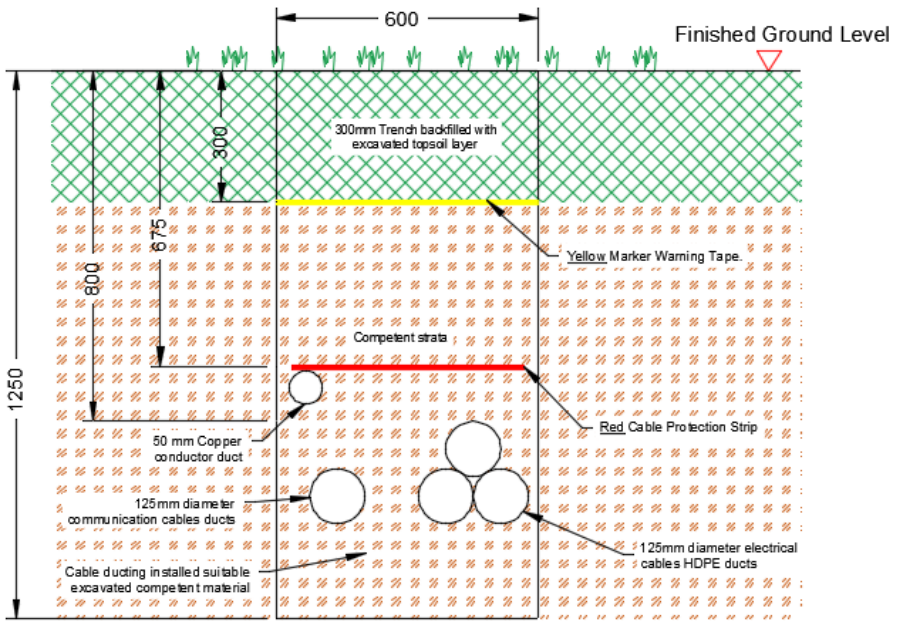
12. A final layer of topsoil, as specified, will then be placed in the trench to ground level.
13. Land will be reinstated follows the methods outlined in RW-OCM-15 Reinstatement of Lands.
14. For public road crossings, the trench will be backfilled using granular fill to within 300mm of the top of the trench and the road surface will be reinstated using road suitable road surfacing material.

Standard Methods: Installing ducting in dry stream bed.

1. The works will take place in a dry stream bed, following damming methods outlined in RW-OCM-9: Instream Works Preparation and Reinstatement.
1. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location and will be temporarily stored in a designated area greater than 10m from the watercourse.
2.
3. A trench will be excavated in the dry stream bed and cable ducts will be laid using the methods outlined in "Standard Methods: Installing cable ducting" above. The excavated materials will be stored further than 10m from the watercourse on flat ground or within a local hollow area. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse. The river gravel/spawning gravel at the surface of the excavation will be stored separately from the excavated subsoil material.
4. Once the ducting has been installed, the trench will be backfilled to within 200mm of the watercourse bed level using the temporarily stored excavated material and the separated river gravel/spawning gravel will then be used to backfill the trench up to the existing stream bed level.
5. Once the stream bed is appropriately re-instated the dam will be removed thus restoring the stream to its original condition.

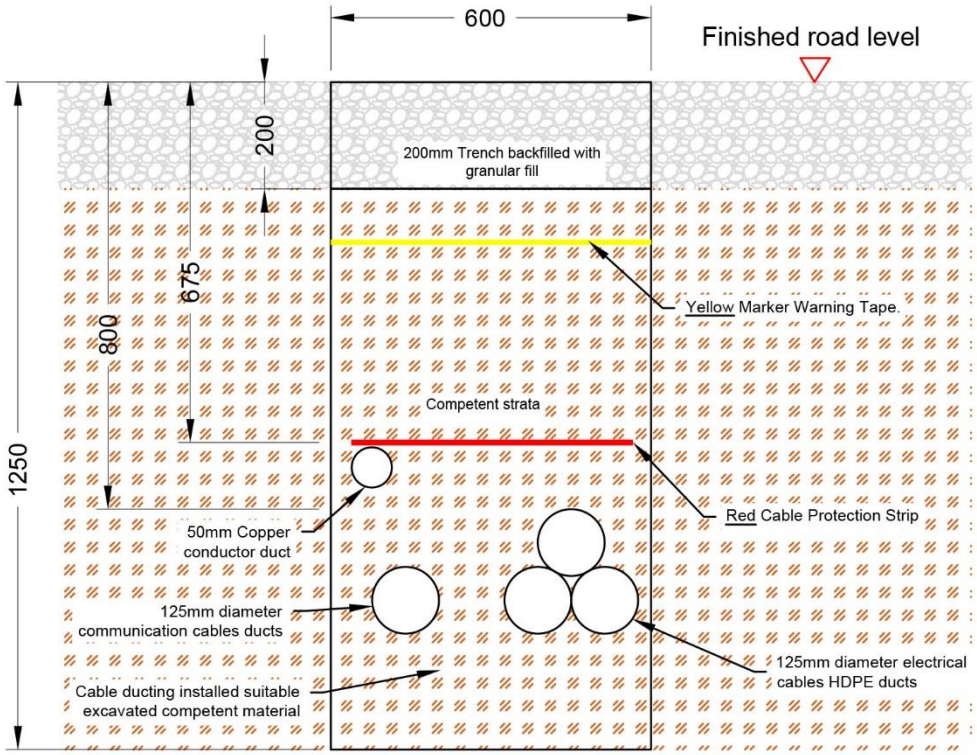
Relevant Volume C3 EIAR Figures:

Figure RW 5.5: Cross Section of Internal Windfarm Cables Trench

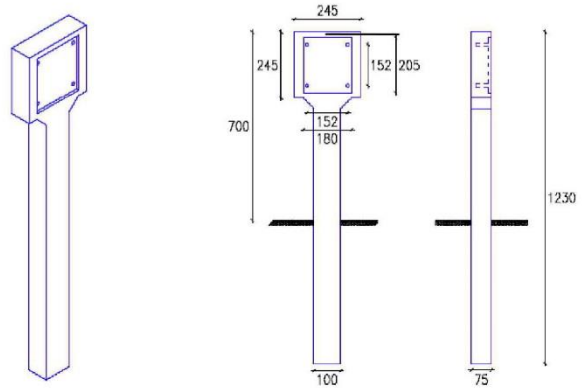


33kV CABLES TRENCH - TYPICAL SECTION THROUGH AGRICULTURAL LANDS AND FORESTRY LANDS

Figure RW 5.6: Cross Section of Internal Windfarm Cabling in Public Road Pavement



33kV CABLES TRENCH - TYPICAL SECTION THROUGH REALIGNED WINDFARM ROADS OR CONCENTED UWF WINDFARM ROADS



TYPICAL MARKER POST AND MARKER PLATE DIMENSIONS

End

Outline Construction Methodology			
Title:	**Instream Works Preparation and Reinstatement**	**Ref:**	**RW-OCM-09**

General Description

Instream works will be required at some watercourse crossing locations in order to install ducts and cabling, replace or widen existing crossing structures or to install new permanent or temporary crossing structures. To facilitate the works, these watercourses will be dammed and the water diverted over or around the works using either over pumping, temporary diversion channels or flume pipes. Following the completion of works at the watercourse, the dam or diversion will be removed and the watercourse reinstated.

Duration

1-2 Days per location

Personnel	Materials	Machinery & Equipment
• 3-4 operatives	• Wheeled or Tracked dumper • 360˚ tracked excavator • Mobile water pumps and hoses • 4 x 4 vehicle and trailer	• Sand Bags containing washed sand • Geotextile membrane • Straw bales • Flume pipes • Splash plate • Silt Buster • Washed round stones

Standard Method 1: Dam & Overpump work

1. A dam will be constructed, upstream of the works location, using sand bags containing washed sand.
2. A mobile pump will be set up beside the watercourse and will pump the water through hoses, from the upstream side of the dam to a point downstream below the works. The pumped water from the hose will be released downstream onto a suitable splash plate to prevent erosion.
3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.
4. The works (outlined in RW.OCM-10 Instream Works) can then be carried out in the dry bed.
5. If required, a temporary sump will be established and used to collect any leakages of water from the dam. This water will be removed by pumping to an infiltration trench or settlement pond if the soil is not saturated, otherwise the water will be pumped to a suitable water treatment train, such as a Siltbuster, where any sediment will be allowed settle before the water is released.
   Following the completion of works at the watercourse, the dam will be removed and the watercourse reinstated as per Instream Reinstatement outlined below.

Standard Method 2: Dam & Divert work

6. A dam and divert method of providing dry stream-bed conditions within the works area involves the diversion of the stream water through a diversion channel before re-entering the watercourse downstream. This is done by excavating a channel along the watercourse bank from upstream of the works to a point downstream of the proposed works. Before any water is allowed to flow into the channel, the channel will be lined with geotextile which will be pinned to the channel banks and a layer of round washed stone will be placed on the bottom to form a bed.

6. A dam will be constructed upstream off the works using sand bags and the flow will then be diverted directly down the new diversion channel to re-enter the watercourse downstream of the works. A splash plate will be located at the point where the flow re-enters the stream to prevent erosion.
7. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.

7. The works (outlined in RW.OCM-10 Instream Works) can then be carried out in the dry stream bed.

8. If required, a temporary sump will be established in the works area and used to collect any leakages of water from the dam. This water will be removed by pumping to an infiltration trench or settlement pond if the soil is not

saturated, otherwise the water will be pumped to a suitable water treatment train, such as a Siltbuster, where any sediment will be allowed settle before the water is released.

8. Following the completion of works at the watercourse, the dam will be removed, the diversion channel filled in using previously excavated materials and the original watercourse reinstated as per Instream Reinstatement outlined below.

Standard Method 3: Dam & Flume work

9. The flume pipe(s) will be set out on the bed of the watercourse.

10. A dam will be constructed using sand bags so that all the flow is diverted through the flume pipe(s).

11. A splash plate will be placed at the downstream end of the flume pipe where the water re-enters the watercourse in order to prevent erosion of the stream bed.

12. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works location to minimise sedimentation

13. The works (outlined in RW.OCM-10 Instream Works) will be carried out under/around the flume pipe(s).

14. If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to an infiltration trench or settlement pond if the soil is not saturated, otherwise the water will be pumped to a suitable water treatment train, such as a Siltbuster, where any sediment will be allowed settle before the water is released.

15. Following the completion of works at the watercourse, the dam and flume pipes will be removed and the watercourse reinstated as per Instream Reinstatement outlined below.

Standard Method: Instream Reinstatement

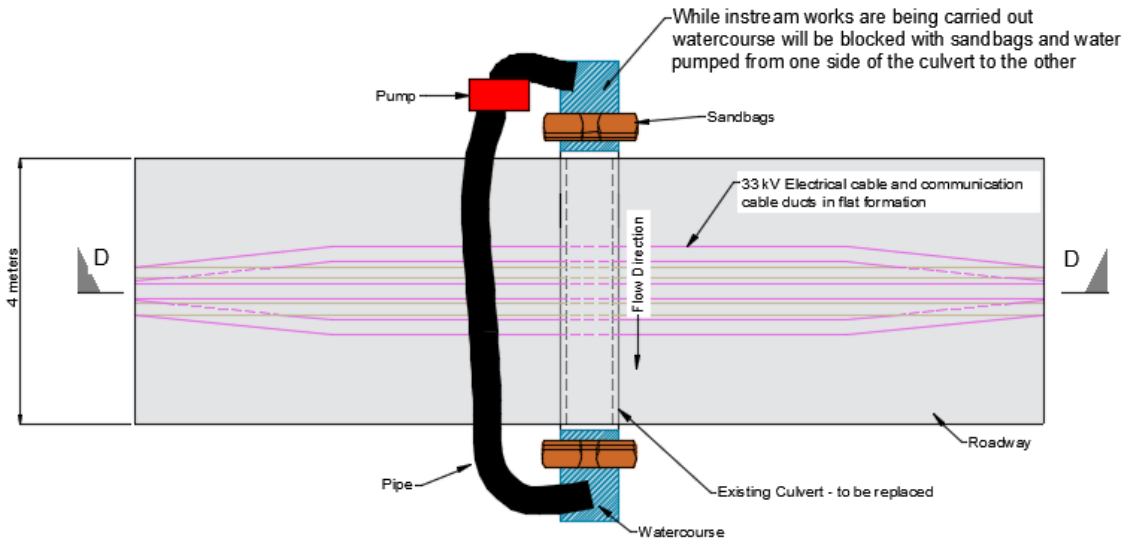
16. Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the watercourse is achieved. Measures will include bank stabilisation using boulder armour or willow/brush bank protection, reinstatement of bank slopes and character, the creation of compound channels where necessary, reinstatement of instream flow features such as boulder substrates, pool/riffle sequences or spawning cobbles and planting to stabilise banks, to add flood protection and to provide a riparian buffer.

Photographs

PVC Flume Pipes

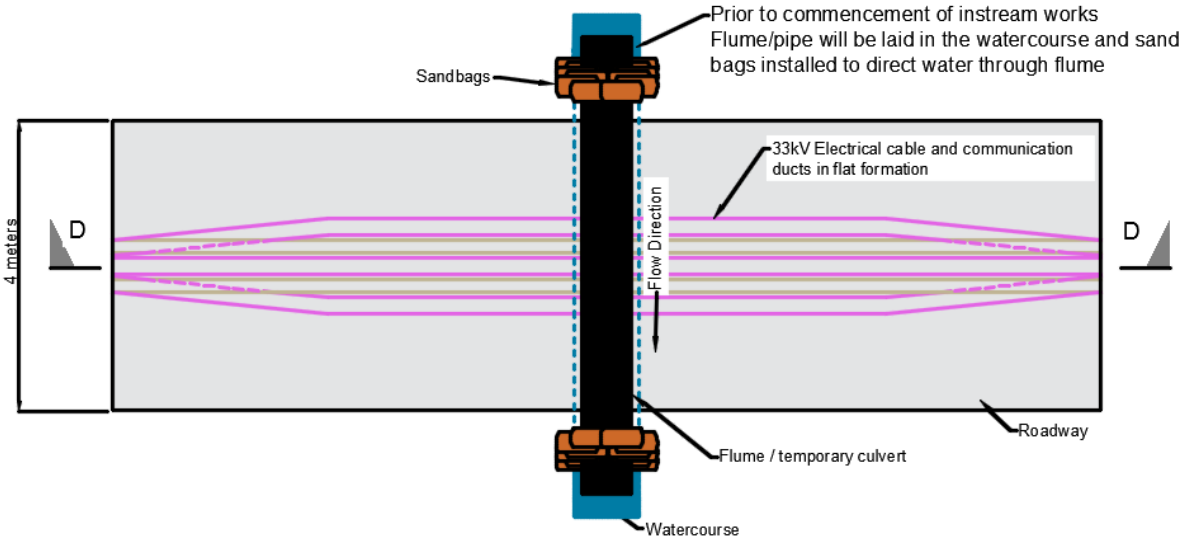
Relevant Drawings from Volume C3 EIAR Figures

Extract from Figure RW 5.17:
Dam & Overpump Work



Plan View of watercourse crossing type B1 - Cable ducts laid in flat formation under replaced structure

Extract from Figure RW 5.19:
Dam & Flume Work



Plan View of watercourse crossing C2 - Cables trench under new temporary crossing structure

(Watercourse dammed and flume installed during instream works)

END

Outline Construction Methodology

Title:	**Instream Works**	**Ref:**	**RW.OCM-10**

General Description

Trenching and ducting and the construction of access roads and associated crossing structures will involve instream works at some watercourse crossing locations in order to install cabling, replace existing crossing structures or to install new permanent or temporary crossing structures, or to facilitate the construction of new access roads.

Duration

1-2 Days per location

Personnel	Materials	Machinery & Equipment
• Site engineer 3-4 operatives	• Wheeled or Tracked dumper. • 360˚ tracked excavator •	• Pipe Culvert • Box Culvert • Cable Ducting & trenching materials • Dry Lean mix concrete • Siltbuster • 50mm stone

Standard Methods: Trenching & Ducting

9. The works will take place in a dry stream bed, following damming methods outlined in RW.OCM-09 Instream Works Preparation and Reinstatement.
10. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location and will be temporarily stored in a designated area greater than 10m from the watercourse.
11. A trench will be excavated in the dry stream bed and cable ducts will be laid using the methods outlined in RW_OCM_08: Internal Windfarm Cabling. The excavated materials will be stored further than 10m from the watercourse on flat ground or within a local hollow area. A containment berm will be placed downslope of the

excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse. The river gravel/spawning gravel at the surface of the excavation will be stored separately from the excavated subsoil material.

12. Once the ducting has been installed, the trench will be backfilled to within 200mm of the watercourse bed level using the temporarily stored excavated material and the separated river gravel/spawning gravel will then be used to backfill the trench up to the existing stream bed level.
13. Once the stream bed is appropriately re-instated the dam will be removed thus restoring the stream to its original condition.
14.

Standard Methods: Replacement of existing culvert

15. The works will take place in a dry stream bed, following damming methods outlined in RW.OCM-09 Instream Works Preparation and Reinstatement.
16. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location and will be temporarily stored in a designated area greater than 10m from the watercourse.
17. The old culvert will be dug out and removed using an excavator.
18. A new HDPE culvert or precast concrete pipe culvert or box culvert will be installed in the watercourse.
19. Where pipe culverts are being installed, 900mm culverts will be used and will be set 300mm into the stream bed. If 1200mm culverts are required, these will be installed 500mm into the original stream bed level. Where a box culvert is used, the culvert will be bottomless and the walls of the culvert will be placed at the sides of the watercourse, 300mm into the streambed.
20. River gravels will then be placed into the pipe culverts to a depth of c.300mm in the 900mm pipes, to a depth of c.500mm in the 1200mm pipes or to a depth of 300mm where excavation had taken place to set in the walls of the box culvert.
21. The dam is removed and the watercourse can flow through the new culvert.
22. Works can then take place above the culvert without the risk of sediments being released into the watercourse.

Variation 14A: Installation of New Culvert Structure and Roadway Crossing.

23. The works will take place in a dry stream bed, following damming methods outlined in GC.OCM-09 Instream Works Preparation and Reinstatement.
24. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the culvert location and will be temporarily stored in a designated area greater than 10m from the watercourse.
25. A new HDPE culvert or precast concrete pipe culvert or box culvert will be installed in the watercourse.
26. Where pipe culverts are being installed, 900mm culverts will be used and will be set 300mm into the stream bed. If 1200mm culverts are required, these will be installed 500mm into the original stream bed level. Where a box culvert is used, the culvert will be bottomless and the walls of the culvert will be placed at the sides of the watercourse, 300mm into the streambed.
27. The dam is removed and the watercourse can flow through the new culvert.
28. Crushed stone will then be laid over the culvert and built up in layers to provide vehicular access above the watercourse.

Variation 14B: Installation of Cable Ducting together with New or Replaced Culvert Structures

29. The cable ducting will either be laid under the watercourse as per the Standard Method Trenching and Ducting described above and a culvert installed as per Variation 14A above or alternatively, in the case where there is enough depth of cover between the new culvert and the existing ground level, the cable can be installed above culvert structure.

Variation 14C: Installation of Temporary Culverts

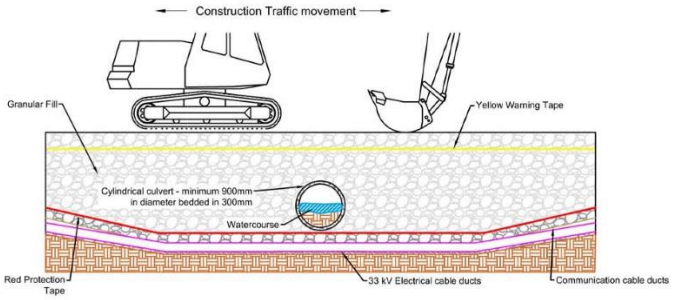
30. The works will take place in a dry stream bed, following damming methods outlined in RW.OCM-09 Instream Works Preparation and Reinstatement.
31. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location and will be temporarily stored in a designated area greater than 10m from the watercourse.
32. A 900mm flume pipe culvert will be placed along the stream bed.

33. 50mm stone will be laid over the culvert and built up in layers to provide vehicular access across the watercourse.
34. When the culvert is no longer required, it will be removed by damming the watercourse as outlined in RW.OCM-09 Instream Works Preparation and Reinstatement, removing the stone and lifting the culvert from the stream.
35. The watercourse will then be reinstated as per RW.OCM-09 Instream Works Preparation and Reinstatement.

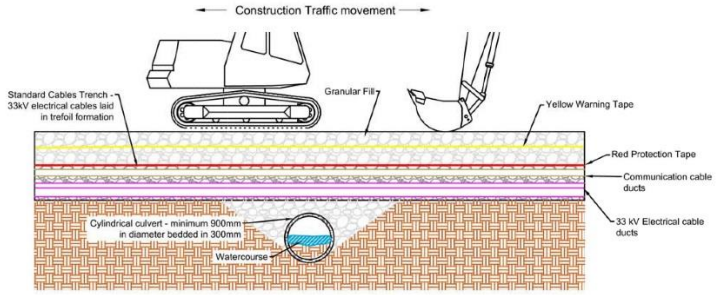
Relevant Drawings from Volume C3 EIAR Figures

Extract from Figure RW 5.18:

Cables under crossing structures & Cables over crossing structures



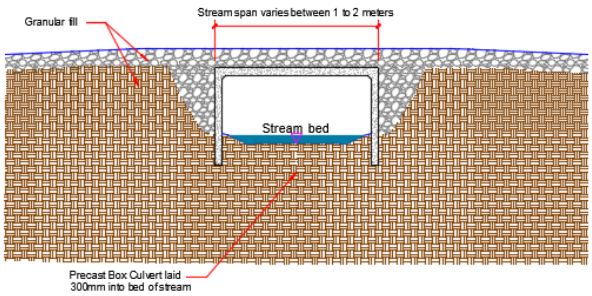
Cross Section View of watercourse crossing
Cables trench under new permanent crossing structure



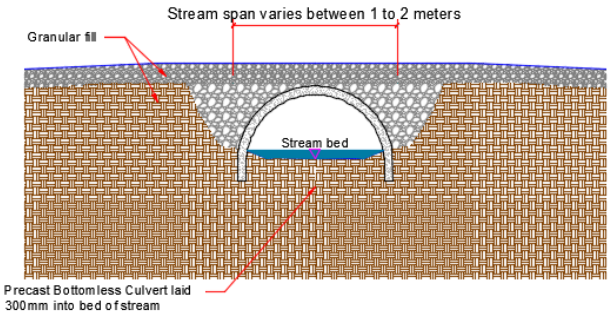
Cross Section View of watercourse crossing
Cables trench over new permanent crossing structure

Extract from Figure RW 5.18:

Box Culverts and Bottomless Box Culverts



Permanent Crossing structure - Bottomless Box Culvert



Permanent Crossing structure - Bottomless Box Culvert

END

Outline Construction Methodology

Title:	**Bailey Bridge Installation**	**Ref:**	**RW-OCM-11**

General Description

Bailey bridges will be used to provide temporary crossing points over watercourses. They will be installed outside of the July – September period and will be built on site from either a pre-engineered system or ready-to-assemble components or will be delivered to site pre-assembled.

Duration

0.5 – 1 day per location

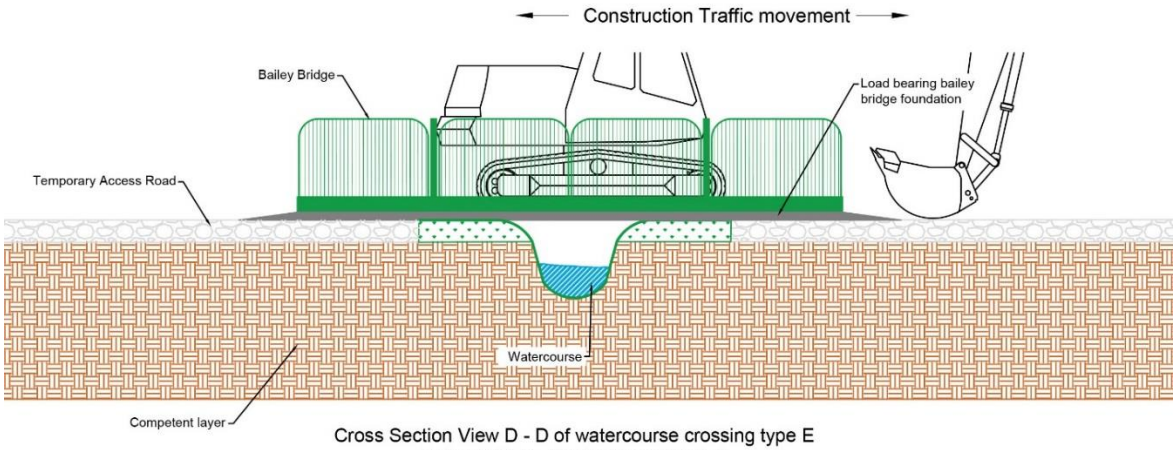
Personnel, Machinery & Equipment	**Materials**
• Site engineer • 2-3 operatives • City Crane / Hi-Ab • Hand tools • Tractor and low loader • Tracked Excavator	• Steel frames • Bearing pads • Clause 804 stone • Granular fill • Geotextile

Standard Methods

1. A temporary access road will be constructed in advance of the arrival of the Bailey bridge .
2. On each side of the watercourse, the top soil will be removed and Clause 804 stone will be in-filled to form bearing pads. The 804 will be compacted to support each end of the Bailey Bridge.
3. The bridge will be delivered to the crossing on a low loader.
4. The bridge will be pre-assembled or assembled using hand tools in situ and lifted into place using the city crane or Hi-Ab.
5. When the works are complete and the bridge is no longer required the bridge will be disassembled and removed from site.
6. The stone from the bearing pads and temporary road will be removed and the excavated soil reinstated and reseeded.

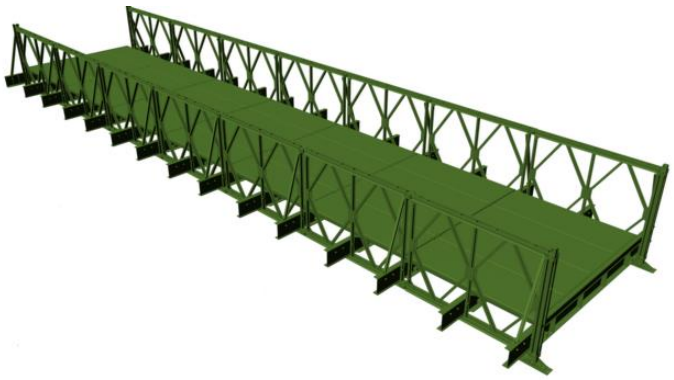
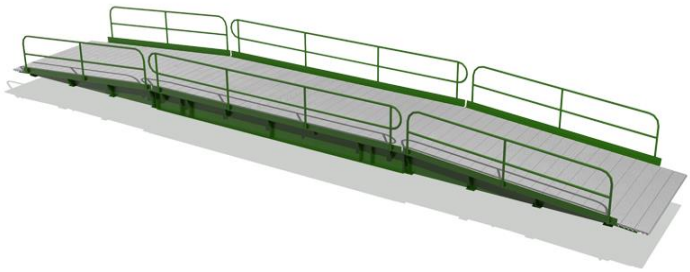
Relevant Volume C3 EIAR Figures

Figure RW 5.21: Watercourse Crossing Type E – Plan and Cross Section Views of Bailey Bridge



Cross Section View D - D of watercourse crossing type E
Bailey Bridge - (No Instream Works)

Relevant Plan Drawings/Photographs

	Typical Bailey Bridge
	Typical Bailey Bridge

References

- Groundforce Bridge – Temporary Bridge (https://www.vpgroundforce.com/ire/temporary-bridges/)

End

Outline Construction Methodology			
Title:	**Upgrading Existing Private Roads to Windfarm Access Roads**	**Ref:**	**RW.OCM-12**

General Description

Some existing farm and forestry roads will be widened and resurfaced to be used as a Windfarm Access Road to accommodate windfarm construction and operational machinery. All upgrading of existing roads will at a minimum, reinstate them to the condition they were in when newly built.

Duration

- 1-3 days per 100m

Personnel, Machinery & Equipment	**Materials**
• Wheeled dumper or Track dumper (6 to 8 tons) • 360˚ tracked excavator (13 Ton normally) • Hand tools • Crew size: 3 operatives • Vibrating roller	• 6" Stone • Geotextile • Granular Fill as per design

Standard Methods

1. The areas of the road that need to be widened will be marked out by the site engineer.
2. Widened road sections will be tied into the existing road and the existing drainage regime will be maintained at each location
3. Dump trucks will be used to transport stone and other material as required.
4. All organic material and soft subsoil will be removed to formation level where roads/entrances are to be widened. Excess material will be stored in berms as per RW.OCM-14 Overburden Storage Berms.
5. Geogrid will be installed where necessary (where poor ground conditions exist).
6. A stone sub-base will be laid if required.
7. A surface layer will be laid over the widened road, if required, which will consist of 150mm compacted Class 6F material, suitable to accommodate HGV traffic.
8. The stone will be compacted using a vibrating roller.
9. The surface will be finished with a 1% gradient to allow water run-off.
10. Bearing capacity of upgraded/widened road sections will be confirmed using on site testing such as Plate Bearing Testing or similar.

Relevant Volume C3 EIAR Figures

Figure RW 5.8: Cross Section of Realigned Windfarm Road

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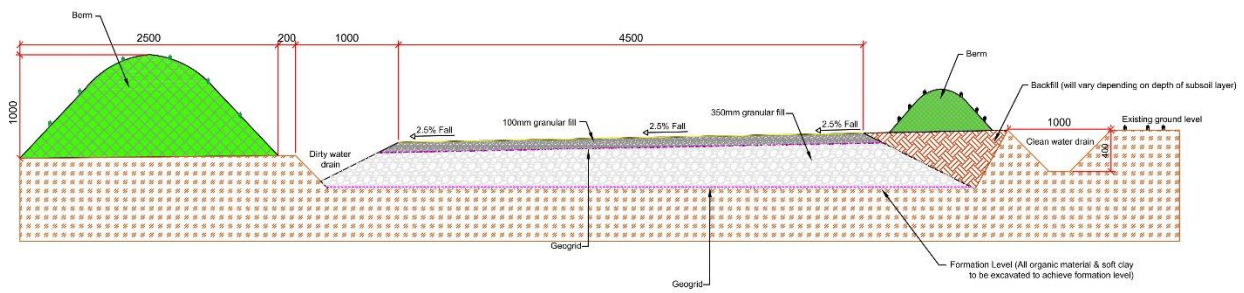


End

Outline Construction Methodology

Title:	**Overburden Storage Berms**	**Ref:**	**RW.OCM-13**

General Description

Overburden will result from an excess of excavated material from the Windfarm Related Works areas during the construction works which will be permanently or temporarily stored in overburden storage berms. The berms will mainly be located adjacent to Realigned Windfarm Roads or the Haul Route Works areas and will be constructed to a 2:1 width/height ratio.

Duration

- For the duration of the works

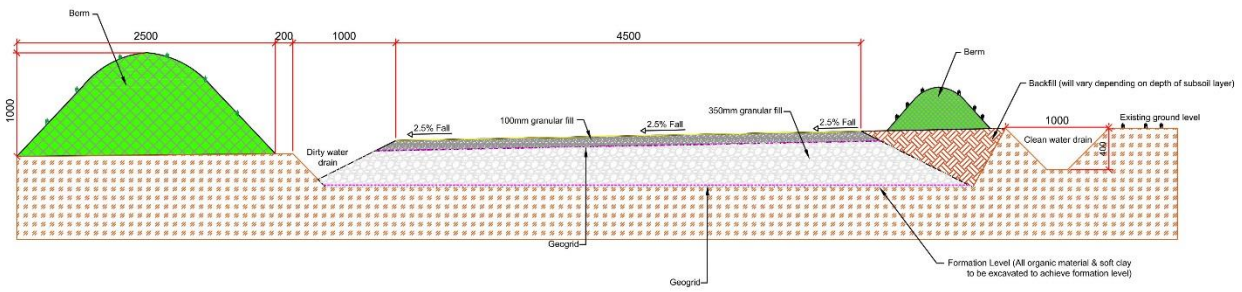
Personnel, Machinery & Equipment	**Materials**
• 1 Excavator • 1 Dump truck	• Grass seed

Standard Methods

1. During the construction of the Realigned Windfarm Roads or the Haul Route Works the excavated material will be used to construct a new bank adjacent to the works area at a sufficient set-back distance.
2. When the overburden material is tipped from the dump truck an excavator will place the material along the selected berm path and shape it to a height of 1 m and to whatever width is required for the amount of overburden required to be stored in the vicinity.
3. The sides will be battered at angles of 45 degrees or less and a light covering of topsoil/subsoil will be added.
4. Permanent berms will be reseeded with grass seed.

Relevant Plan Drawings/Photographs

Figure RW 5.8: Cross Section of Realigned Windfarm Road



End

Outline Construction Methodology			
Title:	**Reinstatement of Land**	**Ref:**	**RW-OCM-14**

General Description

During construction works, vegetation, topsoil and subsoil will be removed from lands to facilitate the construction of the UWF Related Works. Following the completion of construction works, the lands will be will be reinstated to their former condition and returned to the landowner.

Duration

- 1 – 4 days depending on location

Personnel, Machinery & Equipment	Materials
• Crew size: 3 workers • 13 Ton digger • Dump truck • Sub-soiler plough • Levelling harrow	• Native grass, heather, tree and hedgerow species – seeds/seedlings • Fertilizer • Fencing posts and wire

Standard Methods : Reinstating lands

1. Following the completion of works, all building materials and any wastes and debris such as trees, vegetation and brash which does not naturally belong on the site will be removed using an excavator and dump truck.
2. The construction works area will, where required, be sub-soiled using a sub-soil plough to loosen any compacted areas.
3. Sub-soil will be spread using the excavator
4. Topsoil will be spread evenly over the subsoil to surface level using an excavator.
5. The ground will be levelled using a levelling harrow so as to present a level surface and to ensure that the restored area will follow the contours of the surrounding undisturbed ground after restoration is completed.
6. All stones in excess of 50mm will be removed from the surface.
7. The soil will be seeded with grasses and native species common to the surrounding vegetation.
8. Fertilizer will be spread on any sections of improved grassland
9. The lands will remain fenced until sufficiently revegetated, at which time all fencing will be removed off-site.

Standard Methods: Reinstating hedgerows and treelines

1. Boundaries where hedgerow and trees currently exist will be replanted with a mix of native hedgerow species or a new treeline as appropriate.
2. New hedgerows and trees will be fenced to protect from damage by livestock.
3. Earthen banks will be replaced and replanted with grass or hedgerow, as appropriate for the location

Standard Methods: Reinstating fencing and walls

1. Boundaries where timber fences and stone walls and banks currently exist will be reinstated to their former condition.
2. Former timber fencing will be replaced with new timber fence

3. Stone walls, in particular old townland boundary walls will be replaced using the original stone
References
• ESB/IFA Code of Practice for Survey, Construction & Maintenance of Overhead lines in relation to the rights of landowners
End

Outline Construction Methodology			
Title:	**Internal Windfarm Cabling - Cable Pulling & Jointing**	**Ref:**	**RW-OCM-15**

General Description

The electrical and communication cables will be supplied on large steel or timber cable drums. The cables will be pulled through the ducting already installed in the Cable Trench using a cable pulling winch. Installing "one section" of cable involves pulling the individual electrical cables and communication cables into the separate ducts.

Duration

- Site specific, half day to 1 day per cable section between joint bays depending on conditions.

Personnel, Machinery & Equipment	Materials
• Cable Winch and four wheel drive vehicle • 3 operators • Rope Guide Roller • Cable Jacks • Swivel Link • Drum trailer and tractor • four wheel drive vehicle	• Cable attachment lugs • 110kV Electrical Cable • Fibre optical cable • Nylon rope

Standard Methods – Cable Pulling

1. The cables will be jointed approx. 900m apart at locations where c.5m of trench is temporarily left open to allow access to the ducts for the cable pulling and jointing operation.
2. A gap of c.4m is left in the ducting at 900m intervals to give access to the cable ducts. The cable drums will be transported to the open trench locations using a tractor and drum trailer. The cable winch will be transported using a four wheel drive vehicle and will be parked at the next section of open trench along the cable route.
3. Nylon ropes will be blown through the ducts and the winch wire rope will be attached to this rope and pulled from the winch to the drum location.
4. The cable will be connected to the winch rope using approved suitably sized and rated cable pulling stocking and swivel or using a pulling head fitted by the cable manufacturer**.**
5. Rope guide rollers will be placed at the duct opening to guide the cable into the duct.
6. The cable winch will pull the cable from the location where the cable drum is located, through the ducts until it reaches the winch location.
7. Once the pulled cable has reached the winch, the cable is cut and prepared for jointing.

Standard Methods – Cable Jointing

1. Jointing works will involve the joining of the cables using hand held equipment ensuring the area and cable is kept clean from any dust or dirt.
2. The various layers of the cable will be jointed separately with a final layer of heat shrink protection placed over the joint using a blow torch.
3. Following the completion of jointing, the cable will be covered with sand and the trench will be infilled with the previously excavated material from the trench.
4. Testing will then be carried out on the joint and the joint location will be logged for future reference.
5. A cable protection strip is placed over the cable joint and another layer of protection strip will be placed 400mm below the finished ground level. Yellow warning tape will be placed in the trench circa. 300mm below the ground surface.

End

Outline Construction Methodology			
Title:	**Forestry Felling**	**Ref:**	**RW-OCM-16**

General Description

Trees of varying ages will be required to be felled during the construction of the UWF Related Works. The total area to be felled is 0.3Ha, 0.2Ha in Shevry along RWR-01 and 0.1Ha in Knockcurraghbola Commons along the Internal Windfarm Cable.

Duration

- It will take 3 days to complete the required felling.

Personnel, Machinery & Equipment	**Materials**
• One forestry harvester • One timber forwarder machine • Timber lorries • Chainsaws	

Standard Methods

1. The trees will be cut and de-limbed using a forestry harvester machine.
2. The harvester will cut the trees in various length assortments as required.
3. Once cut a timber forwarder machine will extract the timber from the felling area and will stack the timber for collection by forestry trucks. The brash will be baled and removed from site for chipping.
4. All harvesting and extraction will be done in accordance with the Forestry Service Harvesting and Environmental Guidelines.

Relevant Volume C3 EIAR Figures

None

End

UWF RELATED WORKS

VOLUME D
ENVIRONMENTAL MANAGEMENT PLAN

Tab 9
Construction Contract Documents

(post planning consent / pre-construction)

ECOPOWER

January 2019